CURRICULUM VITAE

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H-index: **25** *(Scopus)* **32** *(Scholar)*   *E-mail:* francesc.xavier.trias@upc.edu, xavitrias@gmail.com

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Professional experience and current position

July 2023: positive evaluation in the Programa de Càtedres (Full Professor) at the UPC.

November 2018 - present Associate Professor (*In Catalan: Professor Agregat*) at CTTC (Heat and Mass Transfer Technological Center) in the Technical University of Catalonia (UPC).

November 2013 – November 2018 Senior Researcher at CTTC (Heat and Mass Transfer Technological Center) in the Technical University of Catalonia (UPC). Granted by a Postdoctoral fellowship *Ramón y Cajal (RYC-2012-11996)* by the *Ministerio de Ciencia e Innovación*. **Ranked 1st** in Spain (in the area of Mechanical and Aeronautical Engineering) with 96/100 points.

July 2009 – October 2013 Postdoctoral Researcher at CTTC (Heat and Mass Transfer Technological Center) in the Technical University of Catalonia (UPC). Partially granted by a Postdoctoral fellowship *Juan de la Cierva (JCI-2009-04910)* by the *Ministerio de Ciencia e Innovación*.

June 2007 – June 2009 Postdoctoral Researcher at the Department of Mathematics and Computing Science at the University of Groningen, The Netherlands. Granted by a Postdoctoral fellowship *Beatriu de Pinós (2006 BP-A 10075)* by the *Generalitat de Catalunya*.

Jan. 2007 - May 2007 Postdoctoral Researcher at the Department of Mathematics and Computing Science at the University of Groningen, The Netherlands.

Education

Mar. 2001- Dec. 2006 PhD Student at CTTC (Heat and Mass Transfer Technological Center) in the Technical University of Catalonia (UPC). Thesis: ``Direct numerical simulation and regularization modelling of turbulent flows on loosely coupled parallel computers using symmetry-preserving discretizations''. Final qualification: **Cum Laude**. Granted by a doctoral fellowship FPU (*Formación de Profesorado Universitario*) *(AP2000-3645)* by the *Ministerio de Educación y Ciencia*.

1995-2000 *Master in Mechanical Engineering* in the Technical University of Catalonia (UPC). Final qualification: 8.5/10.
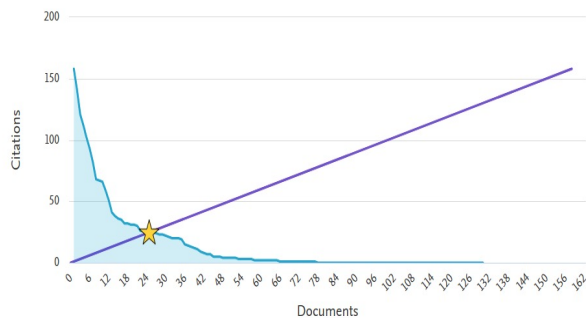
Number of papers in JCR journals: 52 (5 more submitted), **18 as the main (first) author**
Total number of citations: **1920** (Scopus), **2911** (Scholar); H-index: **25** (Scopus), **32** (Scholar)
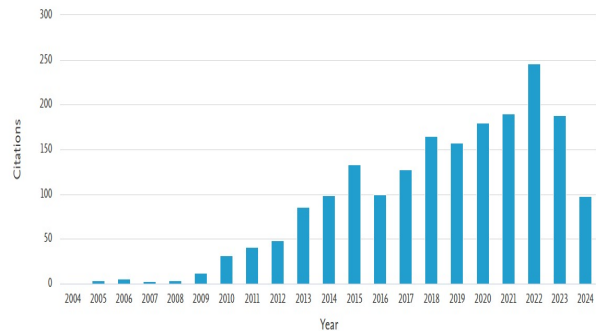
This author's *h*-index   25   Citations by year   1,920

The *h*-index is based upon the number of documents and number of citations.

5. November 2013 – November 2018: Postdoctoral fellowship **Ramón y Cajal** (RYC-2012-11996) by the Ministerio de Ciencia e Innovación. **Ranked 1st in Spain** (in the area of Mechanical and Aeronautical Engineering) with 96/100 points. Amount of the scholarship: 208.600€. Duration: 5 years

4. September 2016: best presentation in the Fourth International Workshop Computational Experiment in AeroAcoustics, Svetlogorsk, Russia, September 2016.

3.November 2009 – October 2012: Postdoctoral fellowship **Juan de la Cierva** (JCI-2009-04910) by the Ministerio de Ciencia e Innovación. Amount of the scholarship: 100.980€. Duration: 3 years

2. June 2007 – May 2009: Postdoctoral fellowship **Beatriu de Pinós** (2006 BP-A 10075) by Agència de Gestió d'Ajuts Universitaris i de Recerca de la Generalitat de Catalunya. Amount of the scholarship: 58.000€. Duration: 2 years

1. October 2001 – September 2005: Predoctoral scholarship **Beca FPU** (Formación de Profesorado Universitario) (AP2000-3645) by the Ministerio de Educación y Cultura. Amount of the scholarship: 60.000€. Duration: 4 years

International Journal Papers:

57. D.Santos, J.A.Hopman, C.D.Pérez-Segarra, and **F.X.Tria**s. "On an energy-preserving unconditionally stable projection method on collocated unstructured grids". (submitted).

56. À.Alsalti-Baldellou, C.Janna, X.Álvarez-Farré, and **F.X.Trias**. "A multigrid reduction framework for domains with symmetries", (submitted).

55. B.Sanderse and **F.X.Trias**. "Energy-consistent discretization of viscous dissipation with application to natural convection flow", (submitted). (https://arxiv.org/abs/2307.10874)

54. N.Morozova, **F.X.Trias**, V.Vanovskiy, C.Oliet, and E.Burnaev. "A multi-fidelity approach for CFD-based surrogate modeling of indoor airflow parameters using sensor readings", (submitted).

53. À.Alsalti, X.Álvarez, G.Colomer, A.Gorobets, C.D.Pérez-Segarra, A.Oliva, **F.X.Trias**. "Lighter and faster simulations on domains with symmetries", Computers & Fluids, 275:106247, 2024.

52. **F.X.Trias**, X.Álvarez-Farré, À.Alsalti-Baldellou, A.Gorobets, and A.Oliva. "An efficient eigenvalue bounding method: CFL condition revisited", (submitted).

51. À.Alsalti-Baldellou, X.Álvarez-Farré, **F.X.Trias**, and A.Oliva. "Exploiting spatial symmetries for solving Poisson's equation", Journal of Computational Physics 486:112133, 2023.

50. A.Duben, J.Ruano, A.Gorobets, J.Rigola, and **F.X.Trias**. "Evaluation of enhanced grey area mitigation approaches based on jet aerodynamics and aeroacoustics simulations", AIAA Journal, 61(2), 2023.

49. N.Morozova, **F.X.Trias**, R.Capdevila, E.Schillaci, and A.Oliva. "A CFD-based surrogate model for predicting flow parameters in a ventilated room using sensor readings". Energy and Buildings, 266:112146, 2022.

48. N.Valle, X.Álvarez, A.Gorobets, J.Castro, A.Oliva, and **F.X.Trias**. "On the implementation of flux limiters in algebraic frameworks" Computer Physics Communications, 271:108230, 2022. (https://arxiv.org/abs/2110.03044)

47. J.Ruano, A.Báez Vidal, J.Rigola and **F.X.Trias**. "A new general method to compute dispersion errors on stretched meshes for both linear and non-linear operators". Computer Physics Communications, 271:108192, 2022.

46. E.Komen, J.A.Hopman, E.M.A.Frederix, **F.X.Trias**, and R.W.C.P.Verstappen. "A symmetry-preserving second-order time-accurate PISO-based method". Computers&Fluids,225:104979, 2021.

45. A.Pont-Vílchez, A.Duben, A.Gorobets, A.Revell, A.Oliva, and **F.X.Trias**. "New strategies for mitigating the Grey Area in DDES models". AIAA Journal, 59(9):3331-3345, 2021.

44. X.Álvarez, A.Gorobets, and **F.X.Trias**. "A hierarchical parallel implementation for heterogeneous computing. Application to algebra-based CFD simulations on hybrid supercomputers". Computers & Fluids, 214:104768, 2021.

43. N.Morozova, **F.X.Trias**, R.Capdevila, C.D.Pérez-Segarra and A.Oliva. "On the feasibility of affordable high-fidelity CFD simulations for indoor environment design and control". Building and Environment, 184:107144, 2020.

42. **F.X.Trias**, F.Dabbagh, A.Gorobets, C.Oliet "On a proper tensor-diffusivity model for large-eddy simulation of buoyancy-driven turbulence". Flow, Turbulence and Combustion, 105:393–414, 2020.

41. F.Dabbagh, **F.X.Trias**, A.Gorobets, and A.Oliva. "Flow topology dynamics in a three-dimensional phase space for turbulent Rayleigh-Bénard convection". Physical Review Fluids, 5:024603, 2020.

40. N.Valle, **F.X.Trias**, and J.Castro. "An energy-preserving level set method for multiphase flows".Journal of Computational Physics, 400(1):108991, 2020. (https://arxiv.org/abs/1909.01114)

39. J.Calafell, **F.X.Trias**, O.Lehmkuhl, and A.Oliva. "A time-average filtering technique to improve the efficiency of Two-Layer Wall Models for Large Eddy Simulation in complex geometries". Computers & Fluids, 188: 44-59, 2019.

38. A.Pont, **F.X.Trias**, A.Gorobets, and A.Oliva. "Direct Numerical Simulation of Backward-Facing Step flow at Re_tau=395 and expansion ratio 2". Journal of Fluid Mechanics, 863:341–363, 2019.

37. **F.X.Trias**, C.Oliet, J.Rigola, and C.D.Pérez-Segarra. "A simple optimization approach for the insulation thickness distribution in household refrigerators". International Journal of Refrigeration, International Journal of Refrigeration, 93:169–175, 2018.

36. **F.X.Trias**, D.Folch, A.Gorobets, and A.Oliva. "Spectrally-consistent regularization of Navier-Stokes equations". Journal of Scientific Computing,79:992–1014, 2019.

35. M.Zambrano, E.Tondi, L.Mancini, G.Lanzafame, **F.X.Trias**, F.Arzilli, M.Materazzi, and S.Torrieri. "Fluid flow simulation and permeability computation in deformed porous carbonate grainstones". Advances in Water Resources, 115:95–111, 2018.

34. X.Álvarez, A.Gorobets, **F.X.Trias**, R.Borrell, and G.Oyarzun. "HPC² - a fully portable algebra-dominant framework for heterogeneous computing. Application to CFD". Computers & Fluids, 173:285–292, 2018.

33. **F.X.Trias**, A.Gorobets, M.H.Silvis, R.W.C.P.Verstappen, A.Oliva. "A new subgrid characteristic length for turbulence simulations on anisotropic grids", Physics of Fluids, 26:115109, 2017.

32. F.Dabbagh, **F.X.Trias**, A.Gorobets, and A.Oliva. "A priori study of subgrid-scale features in turbulent Rayleigh-Bénard convection", Physics of Fluids, 29:105103, 2017.

31. F.Dabbagh, **F.X.Trias**, A.Gorobets, and A.Oliva. "On the evolution of flow topology in turbulent Rayleigh-Bénard convection", Physics of Fluids, 28:115105, 2016.

30. A. Báez Vidal, O.Lehmkuhl, **F.X.Trias**, and C.D.Pérez-Segarra. "On the properties of discrete spatial fillters for CFD", Journal of Computational Physics, 326: 474–498, 2016.

29. **F.X.Trias**, D. Folch, A.Gorobets, and A.Oliva. "Building proper invariants for eddy-viscosity subgrid-scale models", Physics of Fluids, 27: 065103, 2015.

28. H.Zhang, **F.X.Trias**, A.Gorobets, and A.Oliva. "Direct numerical simulation of a fully developed turbulent square duct flow up to Re_tau=1200", International Journal of Heat and Fluid Flow, 54:258–267, 2015.

27. H.Zhang, H.Yuan, **F.X.Trias**, A.Yu, Y.Tan, and A.Oliva. "Particulate immersed boundary method for complex fluid-particle interaction problems with heat transfer", Computers & Mathematics with Applications, 71:391–407, 2016.

26. H.Zhang, **F.X.Trias**, A.Oliva, D. Yang, Y. Tan, S. Shu, Y. Sheng. "PIBM: particulate immersed boundary method for fluid-particle interaction problems", Powder Technology, 272:1-13, 2015.

25. **F.X.Trias**, A.Gorobets, and A.Oliva. "Turbulent flow around a square cylinder at Reynolds number 22000: a DNS study",Computers & Fluids, 123:87–98, 2015.

24. H.Zhang, **F.X.Trias**, A.Gorobets, D. Yang, A.Oliva, Y. Tan, and Y. Sheng. "Effect of collisions on the particle behavior in a turbulent square duct flow", Powder Technology, 269: 320-336, 2015.

23. **F.X.Trias**, O.Lehmkuhl, A.Oliva, C.D.Pérez-Segarra and R.W.C.P.Verstappen. "Symmetry-preserving discretization of Navier-Stokes equations on collocated unstructured grids", Journal of Computational Physics, 258 (1): 246-267, 2014.

22. D. Kizildag, **F.X.Trias**, I.Rodríguez, A.Oliva. "Large-eddy and direct numerical simulations of a turbulent water-filled differentially heated cavity of aspect ratio 5", International Journal of Heat and Mass Transfer, 77:1084–1094, 2014.

21. A.Gorobets, **F.X.Trias** and A.Oliva. "A parallel MPI+OpenMP+OpenCL algorithm for hybrid supercomputations of incompressible flows", Computers & Fluids, 88: 764-772, 2013.

20. H.Zhang, Y.Tan, S.Shu, X.Niu, **F.X.Trias**, D.Yang, H.Li, and Y.Sheng. "Numerical investigation on the role of discrete element method in combined LBM-IBM-DEM modelling", Computers & Fluids, 94: 37-48, 2014.

19. L.Jofre, O.Lehmkuhl, J.Ventosa, **F.X.Trias**, and A.Oliva. "Conservation properties of unstructured finite-volume mesh schemes for the Navier-Stokes equations", Numerical Heat Transfer, Part B: Fundamentals, 65:1–27, 2014.

18. **F.X.Trias**, A.Gorobets and A.Oliva. "A simple approach to discretize the viscous term with spatially varying (eddy-)viscosity", Journal of Computational Physics, 253 (1): 405-417, 2013.

17. **F.X.Trias**, A.Gorobets, C.D.Pérez-Segarra, and A.Oliva. "DNS and regularization modeling of a turbulent differentially heated cavity of aspect ratio 5". International Journal of Heat and Mass Transfer, 57 (1): 171-182, 2013.

16. G.Colomer, R.Borrell, **F.X.Trias**, and I.Rodríguez. "On parallel Sn transport sweep algorithms". Journal of Computational Physics, 232 (1): 118-135, 2013

15. **F.X.Trias**, A.Gorobets, C.D.Pérez-Segarra, and A.Oliva. "Numerical simulation of turbulence at lower cost: Regularization modeling". Computers & Fluids, 80: 251-259, 2013.

14. H.Zhang, Y. Tan, D. Yang, **F.X.Trias**, S. Jiang, Y. Sheng, and A.Oliva. "Numerical investigation of the location of maximum erosive wear damage in elbow: effect of slurry velocity, bend orientation and angle of elbow". Powder Technology, 217:467–476, 2012.

13. J.E. Jaramillo, **F.X.Trias**, A.Gorobets, C.D.Pérez-Segarra, and A.Oliva. "DNS and RANS modelling of a Turbulent Plane Impinging Jet". International Journal of Heat and Mass Transfer, 55:789–801, 2012.

12. **F.X.Trias** and O.Lehmkuhl. "A self-adaptive strategy for the time-integration of Navier-Stokes equations". Numerical Heat Transfer, part B, 60(2):116–134, 2011.

11. A.Gorobets, **F.X.Trias**, R.Borrell, O.Lehmkuhl, and A.Oliva. "Hybrid MPI+OpenMP parallelization of an FFT-based 3D Poisson solver with one periodic direction". Computers & Fluids, 49:101–109, 2011.

10. R.Borrell, O.Lehmkuhl, **F.X.Trias**, and A.Oliva. "Parallel Direct Poisson solver for discretizations with one Fourier diagonalizable direction". Journal of Computational Physics, 230:4723–4741, 2011.

9. **F.X.Trias** and R.W.C.P. Verstappen. "On the construction of discrete filters for symmetry preserving regularization models". Computers & Fluids, 40:139–148, 2011.

8. **F.X.Trias**, R.W.C.P. Verstappen, A.Gorobets, M.Soria, and A.Oliva. "Parameter-free symmetry-preserving regularization modeling of a turbulent differentially heated cavity". Computers & Fluids, 39:1815–1831, 2010.

7. **F.X.Trias**, A.Gorobets, M.Soria, and A.Oliva. "Direct numerical simulation of a differentially heated cavity of aspect ratio 4 with Ra-number up to 1e11 - Part I: Numerical methods and time-averaged flow". International Journal of Heat and Mass Transfer, 53:665–673, 2010.

6. **F.X.Trias**, A.Gorobets, M.Soria, and A.Oliva. "Direct numerical simulation of a differentially heated cavity of aspect ratio 4 with Ra-number up to 1e11 - Part II: Heat transfer and flow dynamics". International Journal of Heat and Mass Transfer, 53:674–683, 2010.

5. A.Gorobets, **F.X.Trias**, M.Soria and A.Oliva, "A scalable parallel Poisson solver for three-dimensional problems with one periodic direction", Computers and Fluids, 39:525–538, 2010.

4. A.Gorobets, S.A. Sukov, and **F.X.Trias**. "The problems of modern supercomputer applications in hydrodynamic and aeroacoustic numerical simulations". TsAGI Science Journal, 41:217–225, 2010.

3. **F.X.Trias**, M.Soria, A.Oliva and C.D.Pérez-Segarra, "Direct numerical simulations of two- and three-dimensional turbulent natural convection flows in a differentially heated cavity of aspect ratio 4", Journal of Fluid Mechanics, vol. 586, pp. 259-293, 2007.

2. **F.X.Trias**, M.Soria, C.D.Pérez-Segarra and A.Oliva, "A Direct Schur-Fourier Decomposition for the Efficient Solution of High-Order Poisson Equations on Loosely Coupled Parallel Computers", Numerical Linear Algebra with Applications, vol.13, pp. 303-326, 2006.

1. M.Soria, **F.X.Trias**, C.D.Pérez-Segarra and A.Oliva, "Direct numerical simulation of a three-dimensional natural-convection flow in a differentially heated cavity of aspect ratio 4", Numerical Heat Transfer, part A, Applications, vol.45, pp. 649-673, 2004.

International Conference Papers (in the last 5 years):

(165 in total; 54 as the first author; for a complete list visit: **www.fxtrias.com/publications.html**)

165. **F.X.Trias**. "Can we hit the ultimate regime of thermal turbulence using large-scale LES simulations?" In HPCSIM Frontiers of High-Performance Computing in Modeling and Simulation, Padova, Italy, September 2023. (PDF presentation)

164. À.Alsalti-Baldellou, **F.X.Trias**, and A.Oliva. "On the evolution of Poisson solvers for extreme scale simulations". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF presentation) (PDF abstract) (PDF paper)

163. L.Bahramian, **F.X.Trias**, C.Oliet, and C.D.Pérez-Segarra. "Numerical analysis of parcel tracking in large eddy simulation of polydispersed multiphase flows: assessment of different parcel modeling techniques". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF presentation) (PDF abstract) (PDF paper)

162. D.Folch, **F.X.Trias**, and A.Oliva. "Assessment of LES models for a fully developed wind-turbine array boundary layer". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF presentation) (PDF abstract) (PDF paper)

161. J.A.Hopman, À.Alsalti-Baldellou, **F.X.Trias**, and J.Rigola. "On a checkerboard-free, conservative method for turbulent flows". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF poster) (PDF abstract) (PDF paper)

160. J.Plana-Riu, **F.X.Trias**, C.D.Pérez-Segarra, and A.Oliva. "Cost-vs-accuracy analysis of self-adaptive time-integration methods". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF presentation) (PDF abstract) (PDF paper)

159. J.Ruano, A.Duben, A.Gorobets, and **F.X.Trias**. "Assessment of grey-area mitigation techniques and their effects on jet aerodynamics and aeroacoustics". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF poster) (PDF abstract) (PDF paper)

158. D.Santos, **F.X.Trias**, J.A.Hopman, and C.D.Pérez-Segarra. "Pressure-velocity coupling on unstructured collocated grids: reconciling stability and energy-conservation". In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF presentation) (PDF abstract) (PDF paper)

157. **F.X.Trias**, A. Gorobets, and A. Oliva. "Can we hit the ultimate regime of thermal turbulence using LES simulations at low Prandtl numbers?" In 10th International Symposium on Turbulence Heat and Mass Transfer, Rome, Italy, September 2023. (PDF presentation) (PDF presentation without movies) (PDF abstract) (PDF paper)

156. À.Alsalti-Baldellou, G.Colomer, J.A.Hopman, X.Álvarez-Farré, **F.X.Trias**, C.D.Pérez-Segarra, and A.Oliva. "Reliable overnight industrial LES: challenges and limitations". Application to CSP technologies. In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF abstract) (PDF paper)

155. L.Bahramian, **F.X.Trias**, C.Oliet, and C.D.Pérez-Segarra. "Numerical assessment of parcel modeling in large eddy simulation for dispersed multiphase flows". In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF abstract) (PDF paper)

154. D.Folch, **F.X.Trias**, and A.Oliva. "On the large-eddy simulation of a fully developed wind-turbine array boundary layer". In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF abstract) (PDF paper)

153. J.A.Hopman, À.Alsalti-Baldellou, **F.X.Trias**, and A.Oliva. "On a conservative solution to checkerboarding: examining the causes of non-physical pressure modes". In 14th International

ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF abstract) (PDF paper)

152. J.Plana-Riu, **F.X.Trias**, C.D.Pérez-Segarra, and A. Oliva. "On self-adaptive Runge-Kutta schemes with improved energy-conservation properties". In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF abstract) (PDF paper)

151. D.Santos, **F.X.Trias**, and R.W.C.P.Verstappen. "On a high-order energy-preserving unconditionally stable discretization on collocated unstructured grids". In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF abstract) (PDF paper)

150. B.Sanderse and **F.X.Trias**. "Energy-consistent discretization of viscous dissipation with application to natural convection flows". In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF presentation) (PDF abstract) (PDF paper)

149. **F.X.Trias**, J.A. Hopman, D.Santos, A.Gorobets, and A.Oliva. "Robust and reliable DNS and LES on unstructured grids". In 14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14), Barcelona, September 2023. (PDF presentation) (PDF presentation without movies) (PDF abstract) (PDF paper)

148. À.Alsalti-Baldellou, C.Janna, X.Álvarez Farré, and **F.X.Trias**. "Exploiting symmetries for preconditioning Poisson's equation in CFD simulations". In Platform for Advanced Scientific Computing (PASC23), Davos, Switzerland, June 2023.(PDF presentation) (PDF paper)

147. À.Alsalti-Baldellou, C.Janna, X.Álvarez-Farré, and **F.X.Trias**. "Low-rank corrections for increasing the arithmetic intensity of the preconditioners". In Parallel Computational Fluids Dynamics, Cuenca, Ecuador, May 2023.(PDF presentation) (PDF abstract)

146. J.Plana-Riu, **F.X.Trias**, À.Alsalti-Baldellou, and A.Oliva. "Strategies for increasing the arithmetic intensity on ensemble averaged parallel-in-time simulations". In Parallel Computational Fluids Dynamics, Cuenca, Ecuador, May 2023.(PDF presentation) (PDF abstract)

145.**F.X.Trias**, À.Alsalti-Baldellou, and A.Oliva. "Exa, zetta, yotta and beyond: on the evolution of Poisson solvers". In Parallel Computational Fluids Dynamics, Cuenca, Ecuador, May 2023.(PDF presentation)(PDF presentation without movies) (PDF abstract)

144.**F.X.Trias**, D.Santos, J.A. Hopman, A.Gorobets, and A.Oliva. "An energy-preserving unconditionally stable method for DNS and LES simulations on unstructured grids". In 22nd Computational Fluid Conference, Cannes, France, April 2023 (PDF presentation) (PDF presentation without movies) (PDF abstract)

143. J.A.Hopman, **F.X.Trias**, and J.Rigola. "A highly portable heterogeneous implementation of symmetry-preserving methods for magnetohydrodynamics". In 3rd Fusion HPC Workshop, Barcelona, December 2022. (PDF abstract) (PDF presentation)

142. J.A.Hopman, **F.X.Trias**, and J.Rigola. "On a conservative solution to checkerboarding: examining the discrete Laplacian kernel using mesh connectivity". In ERCOFTAC WORKSHOP, Direct and Large-Eddy Simulations 13, Udine, Italy, October 2022. (PDF presentation) (PDF abstract) (PDF paper)

141. D.Santos, **F.X.Trias**, G.Colomer, and A.Oliva. "An energy-preserving unconditionally stable fractional step method for DNS/LES on collocated unstructured grids". In ERCOFTAC WORKSHOP, Direct and Large-Eddy Simulations 13, Udine, Italy, October 2022. (PDF presentation) (PDF abstract) (PDF paper)

140. **F.X.Trias**, X.Álvarez-Farré, D.Santos, A.Gorobets, and A.Oliva. "DNS and LES of buoyancy-driven turbulence at high Rayleigh numbers: numerical methods and SGS models". In ERCOFTAC

WORKSHOP, Direct and Large-Eddy Simulations 13, Udine, Italy, October 2022. (PDF presentation) (PDF presentation without movies) (PDF abstract) (PDF paper)

139. À.Alsalti-Baldellou, X.Álvarez-Farré, A.Gorobets, and **F.X.Trias**. "Efficient strategies for solving the variable Poisson equation with large contrasts in the coefficients. In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

138. X.Álvarez, À.Alsalti, G.Colomer, A.Gorobets, A.Oliva, and **F.X.Trias**. "Development of a low-level, algebra-based library to provide platform portability on hybrid supercomputers". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

137. L.Bahramian, J.Muela, C.Oliet, C.D.Pérez-Segarra, and **F.X.Trias**. "An efficient strategy of parcel modeling for polydispersed multiphase turbulent flows". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

136. A.Duben, J.Ruano, **F.X.Trias**, and A.Gorobets. "Towards proper subgrid-scale model for jet aerodynamics and aeroacoustics". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

135. J.A.Hopman, **F.X.Trias**, and J.Rigola. "Symmetry-preserving discretisation methods for magnetohydrodynamics". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PPTX presentation) (PDF abstract) (PDF paper)

134. J. Liu, C.D.Pérez-Segarra, J.Rigola, and **F.X.Trias**. "Effect of hydrogen addition to methane-air jet flame based on Sandia flame D". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

133. N.Morozova, **F.X.Trias**, V.Vanovskiy, C.Oliet, and E.Burnaev. "A CFD-based multifidelity surrogate model for prediction of flow parameters in a ventilated room". In 8th List of publications European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

132. M.Ollé-Bernades, F.Capuano, **F.X.Trias**, and L.Jofre. "Energy-Preserving Stable Computations of High-Pressure Supercritical Fluids Turbulence". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF abstract)

131. D.Santos, **F.X.Trias**, G.Colomer, and A.Oliva. "An energy-preserving unconditionally stable fractional step method on collocated grids". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

130. **F.X.Tria**s, D.Santos, J.A.Hopman, A.Gorobets, and A.Oliva. "On the effect of Prandtl number to subgrid-scale heat flux models". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF presentation without movies) (PDF abstract) (PDF paper)

129. **F.X.Trias**, X.Álvarez-Farré, À.Alsalti-Baldellou, A.Gorobets, and A.Oliva. "DNS and LES on unstructured grids: playing with matrices to preserve symmetries using a minimal set of algebraic kernels". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF presentation without movies) (PDF abstract) (PDF paper)

128. N.Valle, **F.X.Trias**, and R.W.C.P.Verstappen. "On the conservation of primary and secondary

properties in the simulation of multiphase flows". In 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022), Oslo, Norway, June 2022. (PDF presentation) (PDF abstract) (PDF paper)

127. À.Alsalti-Baldellou, X.Álvarez-Farré, A.Gorobets, A.Oliva, and **F.X.Trias**. "Strategies to increase the arithmetic intensity of linear solvers. In Parallel Computational Fluid Dynamics, Alba, Italy, May 2022. (PDF presentation) (PDF abstract)

126. X.Álvarez-Farré, À.Alsalti-Baldellou, A.Gorobets, A.Oliva, and **F.X.Trias**. "On the benefits and applications of sparse matrix-matrix product on various parallel architectures". In Parallel Computational Fluid Dynamics, Alba, Italy, May 2022. (PDF presentation) (PDF abstract)

125. **F.X.Trias**, X.Álvarez, À.Alsalti, A.Gorobets, and A.Oliva. "DNS/LES using a minimal set of algebraic kernels: challenges and opportunities". In Parallel Computational Fluid Dynamics, Alba, Italy, May 2022. (PDF presentation) (PDF presentation without movies) (PDF abstract)

124. X.Álvarez-Farré, À.Alsalti-Baldellou, A.Gorobets, A.Oliva, and **F.X.Trias**. "Enabling larger and faster simulations from mesh symmetries". In 2nd High-Fidelity Industrial LES/DNS Symposium, Toulouse, France (online), September 2021. (PDF abstract)

123. **F.X.Trias**, X.Álvarez-Farré, A.Gorobets, and A.Oliva. "Preserving operator symmetries on unstructured grids: paving the way for DNS and LES simulations on complex geometries". In 2nd High-Fidelity Industrial LES/DNS Symposium, Toulouse, France (online), September 2021. (PDF presentation) (PDF presentation without movies) (PDF abstract)

122. A.Duben, J.Ruano, J.Rigola, and **F.X.Trias**. "Advanced techniques for gray area mitigation in DES simulations and their effects on the subsonic round jet acoustic spectra". In 13th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM13), Rhodes, Greece, September 2021. (PDF presentation) (PDF abstract) (PDF paper)

121. **F.X.Trias**, D.Santos, F.Dabbagh, A.Gorobets, and A.Oliva. "Proper SGS heat flux models and numerical methods for LES". In 13th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM13), Rhodes, Greece, September 2021. (PDF presentation) (PDF presentation without movies) (PDF abstract) (PDF paper)

120. N.Valle, **F.X.Trias**, and R.W.C.P.Vertappen. "Symmetry-preserving discretizations in unstructured staggered meshes". In 13th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM13), Rhodes, Greece, September 2021. (PDF presentation) (PDF abstract) (PDF paper)

119. N.Morozova, **F.X.Trias**, R.Capdevila, and A.Oliva. "Data-driven prediction of flow parameters in a ventilated cavity using high-fidelity CFD simulations". In Building Simulation 2021 Conference, Bruges, Belgium, September 2021.(PDF presentation) (PDF abstract) (PDF paper)

118. À.Alsalti-Baldellou, **F.X.Trias**, X.Álvarez-Farré, A.Oliva. "A highly portable heterogeneous implementation of a Poisson solver for flows with one periodic direction. In Parallel Computational Fluids Dynamics, Nice, France (online), May 2021.(PDF presentation) (PDF abstract)

117. X.Álvarez-Farré, A.Gorobets, **F.X.Trias**, and A.Oliva. "NUMA-aware strategies for the efficient execution of CFD simulations on CPU supercomputers". In Parallel Computational Fluids Dynamics, Nice, France (online), May 2021. (PDF presentation) (PDF abstract)

116. **F.X.Trias**, A.Gorobets, and A.Oliva. "Paving the (right) way for DNS and LES on unstructured grids: (fully) conservative collocated/staggered discretizations". In Parallel Computational Fluids Dynamics, Nice, France (online), May 2021. (PDF presentation with movies) (PDF presentation without movies) (PDF abstract)

115. À.Alsalti-Baldellou, **F.X.Trias**, A.Gorobets, and A.Oliva. "On preconditioning variable Poisson equation with extreme contrasts in the coefficient"s. In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France

(online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

114. X.Álvarez, A.Gorobets, **F.X.Trias**, and A.Oliva. "NUMA-aware strategies for the heterogeneous execution of spmv on modern supercomputers". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

113. A.Duben, A.Pont-Vílchez, A.Gorobets, and **F.X.Trias**. "Evaluation of advanced techniques for the grey area mitigation in the DES approaches". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF abstract)

112. D.Folch, **F.X.Trias**, A.Gorobets, and A.Oliva. "Subgrid-scale model based on the invariants of the gradient model tensor". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

111. E.Komen, J.A.Hopman, E.M.A.Frederix, **F.X.Trias**, R.W.C.P.Verstappen. "Energy-preserving discretisation for LES/DNS with unstructured collocated grids in OpenFOAM". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19). (PDF abstract)

110. N.Morozova, **F.X.Trias**, R.Capdevila, and A.Oliva. "Investigating the capabilities of CFD-based data-driven models for indoor environmental design and control". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

109. J.Ruano, A.Báez-Vidal, J.Rigola, and **F.X.Trias**. "A general method to compute numerical dispersion error". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

108. D.Santos, J.Muela, N.Valle, and **F.X.Trias**. "On the interpolation problem for the poisson equation on collocated meshes". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

107. **F.X.Trias**, N.Valle, A.Gorobets, and A.Oliva. "Symmetry-preserving discretization of Navier-Stokes on unstructured grids: collocated vs staggered". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper) (VIDEO presentation)

106. **F.X.Trias**, F.Dabbagh, D.Santos, A.Gorobets, and A.Oliva. "On a proper tensorial subgrid heat flux model". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper) (VIDEO presentation)

105. N.Valle, **F.X.Trias**, and J.Castro. "Energy preserving multiphase flows: application to falling films". In 14th World Congress in Computational Mechanics and ECCOMAS Congress (WCCM-ECCOMAS 2020), Paris, France (online), July 2020 (postponed to January 2021 due to COVID19 pandemic). (PDF presentation) (PDF abstract) (PDF paper)

104. **F.X.Trias**, F.Dabbagh, D.Santos, A.Gorobets, and A.Oliva. "On a proper tensor-diffusivity model for large-eddy simulations of Rayleigh-Bénard convection". In 17th European Turbulence Conference, Torino, Italy, September 2019. (PDF presentation) (PDF abstract)

103. N.Valle, **F.X.Trias**, and J. Castro. "On the conservation of energy for interface-capturing techniques for multiphase flows. Application to falling films". In 17th European Turbulence Conference, Torino, Italy, September 2019.(PDF presentation) (PDF abstract)

102. N.Morozova, R.Capdevila, **F.X.Trias**, and A.Oliva. "On the Feasibility of CFD for Transient Air Flow Simulations in Buildings". In Building Simulation - 16th IBPSA International Conference and Exhibition, Rome, Italy, September 2019. (PDF presentation) (PDF abstract) (PDF paper)

101. A.Pont, D.Santos, **F.X.Trias**, A.Duben, A.Revell, A.Oliva. "Assessment of LES techniques for mitigating the Grey Area in DDES models". In 8th European Conference for Aeronautics and Space Sciences (EUCASS), Madrid, Spain, July 2019. (PDF presentation) (PDF abstract) (PDF paper)

100. J.Calafell, **F.X.Trias**, and A.Oliva. "An efficient Two-Layer wall model for accurate numerical simulations of aeronautical applications". In 8th European Conference for Aeronautics and Space Sciences (EUCASS), Madrid, Spain, July 2019. (PDF presentation) (PDF abstract) (PDF paper)

99. **F.X.Trias**, F.Dabbagh, A.Gorobets, and A.Oliva. "On a proper tensor-diffusivity model for large-eddy simulations of buoyancy driven flows. In ERCOFTAC WORKSHOP, Direct and Large-Eddy Simulations 12, Madrid, Spain, June 2019. (PDF presentation)(PDF abstract)

98. A.Pont-Vílchez, **F.X.Trias**, A.Duben, A.Revell, and A.Oliva. "Improving DES capabilities for predicting Kelvin-Helmholtz instabilities. Comparison with a backward-facing step DNS". In ERCOFTAC WORKSHOP, Direct and Large-Eddy Simulations 12,Madrid, Spain, June 2019. (PDF presentation) (PDF abstract)

97. X.Álvarez-Farré, A.Gorobets, **F.X.Trias**, and A.Alsalti. "A pure virtual approach for managing platform portability on hybrid supercomputers". In Parallel Computational Fluids Dynamics, Antalya, Turkey, May 2019. (PDF presentation) (PDF abstract)

Supervision of graduate students and postdoctoral fellows

I supervised **10 PhD students** (defenses in: 2008, 2014, 2016, 2017, 2019, 2020, 2021, 2 in 2022 and 2023; see below) resulting in 24 papers (2 more submitted) in top-ranked international journals. **REMARK**: **All of them with *Cum Laude* mention and 7 (out of 10) of these former PhD students stay nowadays in the Academia** (see details below). I am currently supervising **6 PhD students** (defenses expected in: 2 in 2024, 2 in 2025 and 2 in 2026) and **3 postdocs**. Moreover, I have supervised >**10 master thesis** (two of them was in a joint master degree with the University of Groningen) and more than 25 bachelor thesis.

PhD thesis supervised:

10. Àdel Alsalti-Baldellou, "Development of linear solvers for large-scale CFD simulations on hybrid supercomputers" (encrypted with gpg - contact me), Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), December 2023. Current position: Postdoctoral Researcher the University of Padova (Italy).

9. Xavier Álvarez-Farré, "A hierarchical parallel implementation model for algebra-based CFD simulations on hybrid supercomputers", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), September 2022. Current position: Postdoctoral Researcher at SURF supercomputing center (Amsterdam, The Netherlands).

8. Nina Morozova, "Development of CFD-based multi-fidelity surrogate models for indoor environmental applications", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), June 2022. Current position: Software Engineer at Hokus Platform (Barcelona). During her PhD, she received the following awards:

- Fellowship for early career researchers to cover ECCOMAS 2022 conference registration fees, awarded by ECCOMAS association. June 2022.
- Student Travel Award to attend Building Simulation Conference, awarded by International Building Performance Simulation Association. Sep. 2021.
- Fellowship for early career female researchers to cover ECCOMAS 2020 conference registration fees, awarded by John Wiley & Sons. Jan. 2021

7. Nicolás Valle Marchante, "On the development of Direct Numerical Simulations for falling films", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), January 2021. Current position: Postdoctoral Researcher at the TU Delft (The Netherlands).

6. Arnau Pont-Vílchez, "A new grey area mitigation technique for DDES. Theory and assessment", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), December 2020. Current position: Data Team Lead at TrustYou Gmbh company (Germany).

5. Joan Calafell, "Efficient wall modeling for large eddy simulations of general non-equilibrium wall-bounded flows", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), July 2019. Current position: Assistant Professor at UPC.

4. Firas Dabbagh, "Flow topology and small-scale dynamics in turbulent Rayleigh-Bénard convection", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), September 2017. Current position: Senior Scientist at Borealis (Austria).

3. Deniz Kizildag, "Numerical study of the non-Oberbeck-Boussinesq effects in turbulent water-filled cavities", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), February 2016. Current positions: Adjunt Professor at the UPC and Postdoctoral Researcher at the UPC.

2. Hao Zhang, "Numerical investigation of particle-fluid interaction system based on discrete element method", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), November 2014. Current position: Associate Professor at the Northeastern University (China).

1. Andrey V. Gorobets, "Parallel algorithms for direct numerical simulations of incompressible turbulent flows on supercomputers", Technical University of Catalonia (UPC), Heat and Mass Transfer Technological Center (CTTC), October 2008. Current positions: Professor of the Russian Academy of Sciences (RAS), Leading researcher at Keldysh Institute of Applied Mathematics (KIAM) of RAS and Associate Professor at Lomonosov Moscow State University (Russia). During and in the years after his PhD he received the following awards:

- President's Prize in Science and Innovation for Young Scientists for 2013
- Winner of the Russian Federation President grant for young scientists MK-2010
- The prize in "Maximal scalability" competition (2nd place) by Intel and RUSNANO, 2009
- Medal of RAS for young scientists 2009

Teaching experience

2011-present Co-coordinator/lecturer of the subject "*Turbulència: fenomenologia, simulació i aerodinàmica*" in the Masters of "Energy Engineering", "Industrial Engineering" and "Thermal Engineering" at the Technical University of Catalonia (UPC).

2012-present Co-coordinator/lecturer of the subject "*Computational Engineering*" in the Master of Aeronautical Engineering at Technical University of Catalonia (UPC).

2017-present Lecturer of the subject *"Enginyeria Tèrmica"* in Bachelor's degree in Mechanical Engineering at Technical University of Catalonia (UPC).

2017-present Co-coordinator/lecturer of the subject "*Turbulence: phenomenology, simulation and aerodynamics*" in the Masters of "Aeronautical Engineering" and "Space and Aeronautical Engineering" at Technical University of Catalonia (UPC).

2009-2011: Lecturer/tutor of "Fluid Mechanics" and "Energy Technology" at the Universidad Nacional de Educación a Distancia (UNED).

2004-2006: Teacher in the Master of Thermal Engineering and Energy Technology at the Technical University of Catalonia (UPC).

2004-2006: Lecturer/tutor of "Fluid Mechanics" at the Universidad Nacional de Educación a Distancia (UNED).

Participation in Research Projects funded in competitive tenders by public or private bodies

On-going projects: (projects as **Principal Investigator** are highlighted in **bold**)

72. Research Project IM-2024-1-0031; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Assessment of a new stable regularization of the gradient model for Large-Eddy Simulation of thermal turbulence*; PI: F.Xavier Trias; Period: 2023 (4 months). Role: **Principal Investigator**.

71. Research Project PID2022-142174OB-I00; Funding: Ministerio de Ciencia e Innovación; Title: *Advanced numerical algorithms for the efficient SIMulation of innovative heat EXchangers using modern computational architectures (SIMEX)*; Period: 2023-2026. Funding: 250.000€. Role: **Principal Investigator**.

70. Research Project RETOtwin PDC2021-120970-I00; Funding: MINECO (Spanish Government); Title: *Desarrollo de un gemelo digital de un REceptor de TOrre CSP basado en un nuevo paradigma de CFD&HT algebraico.* Period: 2021-2024. Funding: 103.500€. Role: **Principal Investigator**.

69. Research Project COLDPOST ACE034/21/000036; Funding: Generalitat de Catalunya. Title: *Disseny i desenvolupament d'un carregador públic per vehicle elèctric amb refrigeració activa (COLDPOST).* Period: 2021-2024. Funding: 96.122€. Role: Researcher

68. Research Project ACE054/22/000026; Funding: Agència per la Competitivitat de l'Empresa (ACCIO) by Generalitat de Catalunya. Title: *Servei de monitorització de gasos contaminants i d'efecte hivernacle*. Period: 2022-2025. Funding: 75.522€. Role: Researcher

67. Research Project GREENKILN CPP2021-008628; Funding: Ministerio de Ciencia e Innovación. Title: *Modelado numérico y validación experimental para la implementación de combustible H2 en hornos de fabricación de cerámica sanitaria (GREENKILN).* Period: 2022-2025. Funding: 233.761€. Role: Researcher

Completed projects: (projects as **Principal Investigator** are highlighted in **bold**)

66. Research Project IM-2023-1-0022; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Can we hit the ultimate regime of thermal turbulence using LES simulations at low Prandtl numbers?*; PI: F.Xavier Trias; Period: 2023 (4 months). Role: **Principal Investigator**.

65. Research Project EJEMOD H2020-CS2-101008100 Cleansky 2 project *Engine bleed JEt pumps continuous behaviour MODelization*. Period: 2021-2023 Funding: 184.125€. Role: <u>Researcher</u>

64. Research Project ECOSUN (Solar Era NET) Ref: J-02628 Title: *Economic COgeneration by Efficiently COncentrated SUNlight* Period: 2020-2023 Funding: 145.500€. Role: <u>Researcher</u>

63. Research Project IM-2022-3-0026; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Can we hit the ultimate regime of thermal turbulence using LES simulations at low Prandtl numbers?*; PI: F.Xavier Trias; Period: 2022 (4 months). Role: **Principal Investigator**.

62. Research Project PRACE-DEV-2022D01-073; Tier-0 PRACE supercomputing project for code development; Title: *Optimizing the HPC2 framework for exascale CFD simulations on HAWK supercomputer*; Awarded with 250000 core hours on HAWK supercomputer; Period: 2022 (6 months). Role: **Principal Investigator**.

61. Research Project PRACE-DEV-2022D01-045; Tier-0 PRACE supercomputing project for code development; Title: *Optimizing the HPC2 framework towards exascale simulation of low Prandtl buoyancy-driven turbulence*; Awarded with 2300 GPU hours on Marconi100 and 250000 core hours on HAWK supercomputer; Period: 2022 (6 months). Role: **Principal Investigator**.

60. Research Project IM-2022-2-0019; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct and Large-Eddy Simulation of buoyancy-driven turbulence at high Prandtl numbers*; PI: F.Xavier Trias; Period: 2022 (4 months). Role: **Principal Investigator**.

59. Research Project No. 075-15-2019-1623. Funding agency: Ministry of Science and Higher Education of the Russian Federation. Title: *Development of hybrid RANS-LES methods and parallel algorithms for scale-resolving supercomputer simulation of compressible turbulent flows*. Period: 2020-2022. Role: <u>Researcher.</u>

58. Research Project IU16-011591 CTTC P4; Funding: Estratègia de recerca i innovació per a l'especialització intel·ligent de Catalunya (RIS3CAT); Departament d'Empresa i Coneixement; Generalitat de Catalunya. Title: 001-P-001646_BASE 3D. Period: 2019-2022. Funding: 69.866,22€. Role: <u>Researcher</u>

57. Research Project ENE2017-88697-R; MINECO (Spanish Government); Title: *Advanced numerical algorithms for the improvement of the efficiency applied to wind-energy and solar thermal: tackling with new computational arquitectures*; Period: 2018-2020. Funding: 151.250€ + 4-year (2019-2022) PhD grant (80.000€) Role: **Principal Investigator**.

56. Research Project IM-2022-1-0015; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct and Large-Eddy Simulation of buoyancy-driven turbulence at high Prandtl numbers*; PI: F.Xavier Trias; Period: 2022 (4 months). Role: **Principal Investigator**.

55. Research Project IM-2021-1-0015; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct and Large-Eddy Simulations for creating reduced-order data-driven models for improving the indoor environment air quality*; Period: 2021. Role: **Principal Investigator**.

54. Research project H2020-CS2-CFP07-2017-02 Cleansky 2 project: Funding: 239.070 Euros, Title: *A New proTection devIce for FOD (ANTIFOD)*, Period: 2018-2021. Role: Researcher

53. Project EQC2018-005106-P; MINECO (Spanish Government); Title: *Actualización y ampliación del ordenador paralelo del campus de Terrassa de la UPC*; Period: 2018-2021. Funding: 148.750€. Role: <u>Researcher</u>

52. Research Project EIT-UM-2020-20002 CAROLINA; Funding: European Institute of Innovation & Technology; European Union. Title: *Real-time pollution City mAp thRough cOLlaborative*

sensIng aNd Analysis. Period: 2020. Funding: 118.124€. Role: <u>Researcher</u>

51. Research Project IM-2020-3-0030; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct and Large-Eddy Simulation of buoyancy-driven turbulence in liquid metals*; Period: 2020. Role: **<u>Principal Investigator</u>**.

50. Research Project IM-2020-2-0029; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct and Large-Eddy Simulation of buoyancy-driven turbulence in liquid metals*; Period: 2020. Role: **<u>Principal Investigator</u>**.

49. Research Project IM-2020-1-0006; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *DNS of a vertically falling film*; Period: 2020. Role: **<u>Principal Investigator</u>**.

48. Research Project IM-2019-3-0026; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *DNS of a vertically falling film*; Period: 2019. Role: **<u>Principal Investigator</u>**.

47. Research Project FI-2019-2-0021; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Exploring nonlinear subgrid-scale heat flux models for buoyancy driven flows*; Period: 2019. Role: **<u>Principal Investigator</u>**.

46. Research Project FI-2019-1-0040; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Exploring nonlinear subgrid-scale heat flux models for buoyancy driven flows*; Period: 2019. Role: **<u>Principal Investigator</u>**.

45. Research Project Ref. 2016163972; Tier-0 PRACE supercomputing project; Title: *Exploring new frontiers in Rayleigh-Bénard convection;* Awarded with 33.1Mh on MareNostrum IV in the PRACE 15th Call. Role: **<u>Principal Investigator.</u>**

44. Research Project FI-2017-2-0041; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct numerical simulation of turbulent flow at high Reynolds number over a backward-facing step*; Period: 2017. Role: **<u>Principal Investigator</u>**.

43. Research Project ENE2014-60577-R; MINECO (Spanish Government); Title: *Development of high-performance parallel codes and algorithms for the improvement of the efficiency applied to wind-energy, solar thermal and building*; Period: 2015-2017. Funding: 121.000€ Role: **<u>Principal Investigator.</u>**

42. Research Project FP7-620129-EFFAN; European Commission; Title: *Efficient Fan*. Funding: 54.000€ Role: <u>Researcher</u>. Description: advanced CFD tools are being used for designing a electrical ram air fan with two objectives: a) generate pressure drop at low flows without surge issues; b) cooling of the fan electrical motor at high inlet air temperatures.

41. Research Project FP7-632508-HOT; European Commission; Title: *Humidity Optimisation Tool*; Period: 2014-2017. Funding: 54.000€ Role: <u>Researcher</u>. Description: the purpose of the "Humidity Optimization Tool" project is to develop a tool able to predict generation and growth of water fogs in the ECS, in order to avoid them.

40. Research Project FI-2016-3-0040; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct numerical simulation of turbulent flow at high Reynolds number over a backward-facing step*; Period: 2016-2017. Role: **<u>Principal Investigator</u>**.

39. Research Project FI-2016-3-0036; Funding: Ministerio de Ciencia e Innovación; Generalitat de

Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Building a new subgrid characteristic length for Large-Eddy Simulation*; Period: 2016-2017. Role: **Principal Investigator**.

38. Research Project FI-2016-2-0030; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Building a new subgrid characteristic length for Large-Eddy Simulation*; Period: 2016-2017. Role: **Principal Investigator**.

37. Research Project FI-2016-1-0013; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Advanced turbulence models for buoyancy driven flows*; Period: 2016. Role: **Principal Investigator**.

36. Research Project FI-2015-2-0030; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Advanced turbulence models for buoyancy driven flows*; Period: 2015. Role: **Principal Investigator**.

35. Research Project FI-2015-1-0028; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Flow topology in turbulent natural convection: direct numerical simulation and advanced turbulence modeling*; Period: 2015. Role: **Principal Investigator**.

34. Research Project FI-2014-3-0025; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Flow topology in turbulent natural convection: direct numerical simulation and advanced turbulence modeling*; Period: 2015. Role: **Principal Investigator**.

33. Research Project FI-2014-2-0023; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent flow through a square duct: direct numerical simulation and advanced turbulence modeling*; Period: 2014. Role: Researcher.

32. Research Project FI-2014-1-0030; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent flow around a square cylinder at high Reynolds numbers: direct numerical simulation and regularization modeling*; Period: 2014. Role: Researcher.

31. Research Project FI-2013-3-0020; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent flow through a square duct: direct numerical simulation and advanced turbulence modeling*; Period: 2014. Role: Researcher.

30. Research Project J01595; ref: ENE 2010-17801; MEC (Spanish Government); Title: *Development of high performance parallel codes and algorithms for optimizing the design of thermal systems and equipments*. Period:2011 – 2013. Role: Researcher.

29. Research Project FI-2013-2-0018; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent flow around a square cylinder at high Reynolds numbers: direct numerical simulation and regularization modeling*; Period: 2013. Role: Researcher.

28. Research Project FI-2013-1-0021; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent flow around a square cylinder at high Reynolds numbers: direct numerical simulation and regularization modeling*; Period: 2013. Role: Researcher.

27. Research Project FI-2012-3-0020; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing

Center. Title: *Turbulent flow around a square cylinder at high Reynolds numbers: direct numerical simulation and regularization modeling*; Period: 2013. Role: <u>Researcher</u>.

26. Research Project FI-2012-2-0020; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent natural convection in enclosed cavities. On the role of transitional thermal boundary layers in the flow structure*; Period: 2012. Role: <u>Researcher</u>.

25. Research Project FI-2012-1-0014; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Turbulent natural convection in enclosed cavities. On the role of transitional thermal boundary layers in the flow structure*; Period: 2012. Role: <u>Researcher</u>.

24. Research Project FI-2011-3-0019; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Exploring new frontiers in turbulent natural convection flows*; Period: 2013. Role: <u>Researcher</u>.

23. Research Project FI-2011-2-0011; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Exploring new frontiers in turbulent natural convection flows*; Period: 2011. Role: <u>Researcher</u>.

22. Research Project FI-2011-1-0013; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Regularization Modeling of Turbulent Natural Convection Flows*; Period: 2011. Role: <u>Researcher</u>.

21. Research Project FI-2010-3-0018; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Regularization Modeling of Turbulent Natural Convection Flows*; Period: 2011. Role: <u>Researcher</u>.

20. Research Project J01270; ref. ENE2007-67185 (Spanish Government); Title: *Development of high performance parallel codes for the design and optimization of thermal systems and equipments*; Period:2007-2010. Role: <u>Researcher</u>.

19. Research Project C06335; ref. PET 2006-0343; Company: AIRTECNICS; Title: Analysis of air curtains: optimization, design, parametric studies and interaction with the environment. Conception of new designs; Period: 2006-2010. Role: <u>Researcher</u>.

18. Research Project FI-2010-2-0021; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Regularization Modeling of Turbulent Natural Convection Flows*; Period: 2010. Role: <u>Researcher</u>.

17. Research Project FI-2010-1-0025; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of Turbulent Natural Convection Flows in Enclosed Cavities*; Period: 2010. Role: <u>Researcher</u>.

16. Research Project FI-2009-3-0023; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of Turbulent Natural Convection Flows in Enclosed Cavities*; Period: 2010. Role: <u>Researcher</u>.

15. Research Project CYLINDER; Funding body or bodies: Unió Europea – FP7 program.Title: *Numerical simulation of turbulent flow past a circular cylinder at Re=20000-200000;* Period: 2009. Role: **<u>Principal Investigator</u>**.

14. Research Project FI-2009-2-0028; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of a Turbulent Plane Impinging Jet at Re-number up to 30000*; Period: 2009. Role: Researcher.

13. Research Project FI-2009-1-0024; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of a Turbulent Plane Impinging Jet at Re-number up to 30000*; Period: 2009. Role: Researcher.

12. Research Project FI-2008-2-0036; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of Turbulent Flow Around A Wall-Mounted Cube at Re-number up to 10000*; Period: 2008. Role: Researcher.

11. Research Project FI-2008-1-0024; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of Turbulent Flows in Complex Geometries*; Period: 2008. Role: Researcher.

10. Research Project FI-2007-3-0016; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of Turbulent Flows in Complex Geometries*; Period: 2008. Role: Researcher.

9. Research Project FI-2007-2-0026; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct numerical simulation of turbulent flows in complex geometries*; Period: 2007. Role: Researcher.

8. Research Project FI-2007-1-0035; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation Of Turbulent Flows In Complex Geometries*; Period: 2007. Role: Researcher.

7. Research Project FI-2006-4-0019; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of turbulent flows*; Period: 2007. Role: Researcher.

6. Research Project J00872; ref. TIC2003-07970; MEC (Spanish Government); Title: *Development of high performance codes for loosely coupled parallel computers for optimal design of thermal systems and units*; Period: 2004-2006. Role: Researcher.

5. Research Project FI-2006-3-0013; Funding: Ministerio de Ciencia e Innovación; Generalitat de Catalunya. Depart. de Cultura i Mitjans de Comunicació. Location: Barcelona Supercomputing Center. Title: *Direct Numerical Simulation of turbulent flows*; Period: 2006. Role: Researcher.

4. Research Project J00892; ref. VEM2003-20046; Dirección General de Investigación (Spanish Government); Title: *Development of a tailor made code for the numerical simulation of the fluid dynamic and thermal behavior of heavy oils contained inside sunken ships*; Period: 2003-2006. Role: Researcher.

3. Research Project E00755; ref. ENK6-CT-2002-30033, GREENFACADE-VER; The CTTC is the Research Project Coordinator; European Commission; Companies: Biosca & Botey, Jardinería Bordas S.A., Percurso, Nature, Arquitectura Produccions, Juhling GBR; Title: *Vegetation for cooling advanced glaced facades: architectural integration, gardening technology*, numerical simulation; Period: 2003-2004. Role: Researcher.

2. Research Project DGICYT ref. Nº2 FD97-1625. Title: *Development of a numerical and experimental infrastructure for the design and optimization of flat plane collectors. Development of*

new prototype collectors and application to absorption cooling machines. Period: 2000-2003. Role: Researcher.

1. Project Title: *Desarrollo de nuevas tecnologias para un sistema eficiente ecológico e inteligente de lavado de los textiles del futuro*. Funding body: FAGOR ELECTRODOMÉSTICOS S.COOP. Body where project took place: CTTC - Heat and Mass Transfer Technological Center. Start date: 16/03/2010 Duration of project: 2 years, 9.5 months; Total amount: 290.000€. Role: Researcher.

Patents

7. Application number: DE602014075394T2; Title: *Machine for air-cooled absorption*. Co-authors: A.Oliva; C.D.Pérez-Segarra; J.Rigola; J.Castro; C.Oliet; I.M.Rodríguez; O.Lehmkuhl; **F.X.Trias**; R.Capdevila; R.Alba; M.M.Ordoño; J.Farnós. Patent holding body: Universitat Politècnica de Catalunya. Date: 03/03/2021

6. Application number: ES2828525T3; Title: *Sistema de almacenamiento de energía térmica combinando material sólido de calor sensible y material de cambio de fase*. Co-authors: A.Oliva; C.D.Pérez-Segarra; J.Rigola; J.Castro; C.Oliet; I.M.Rodríguez; O.Lehmkuhl; **F.X.Trias**; R.Capdevila; R.Alba; M.M.Ordoño; P.Galione. Patent holding body: Universitat Politècnica de Catalunya. Date: 26/05/2021

5. Application number: PCT/ES/2014/070468; Title: *Máquina de absorción refrigerada por aire*. Co-authors: A.Oliva; C.D.Pérez-Segarra; J.Rigola; J.Castro; C.Oliet; I.M.Rodríguez; O.Lehmkuhl; **F.X.Trias**; R.Capdevila; R.Alba; M.M.Ordoño; J.Farnós. Patent holding body: Universitat Politècnica de Catalunya. Date: 14/05/2014.

4. Application number: PCT/ES2014/070400; Title: *Acumulador de energía térmica en base a materiales de cambio de la fase sólido-líquido y método de fabricación de la unidad*. Co-authors: A.Oliva; C.D.Pérez-Segarra; J.Rigola; J.Castro; C.Oliet; I.M.Rodríguez; O.Lehmkuhl; **F.X.Trias**; R.Capdevila; R.Alba; M.M.Ordoño; J.J.Morales. Patent holding body: Universitat Politècnica de Catalunya. Date: 14/05/2014.

3. Application number: P201330887; Title: *Máquina de absorción refrigerada por aire*. Co-authors: A.Oliva, C.D.Pérez-Segarra, J.Rigola, J. Castro, C.Oliet, I.Rodríguez, O.Lehmkuhl, **F.X.Trias**, R.Capdevila, R.Alba, M.Ordoño, J.Farnós. Patent holding body: Universitat Politècnica de Catalunya. Date: 14/06/2013.

2. Application number: P201330652; Title: *Acumulador de energía térmica en base a materiales de cambio de fase sólido-líquido y método de fabricación de la unidad*. Co-authors: A.Oliva, C.D.Pérez-Segarra, J.Rigola, J. Castro, C.Oliet, I.Rodríguez, O.Lehmkuhl, **F.X.Trias**, R.Capdevila, R.Alba, M.Ordoño, S.Morales. Patent holding body: Universitat Politècnica de Catalunya. Date: 01/03/2013.

1. Application number: P201232038; Title: *Sistema de almacenamiento de energía térmica combinando material sólido de calor sensible y material de cambio de fase*. Co-authors: A.Oliva, C.D.Pérez-Segarra, J.Rigola, J. Castro, C.Oliet, I.Rodríguez, O.Lehmkuhl, **F.X.Trias**, R.Capdevila, R.Alba, M.Ordoño, S.Morales. Patent holding body: Universitat Politècnica de Catalunya. Date: 27/12/2012.

Since I visited the <u>Department of Mathematics and Computing Science</u> at the <u>University of Groningen</u> (The Netherlands) during the spring of 2004, I **have visited several international institutions and accumulated almost 5 years (59 months)**. This includes a stay at the <u>Mechanical and Aerospace Engineering Department</u> at the <u>University of California, Los Angeles</u> (UCLA), where I had the opportunity to work with *Prof. John Kim*, well-known for his pioneering works on direct numerical simulation of turbulence and main author of the most cited paper in this field. These stays were financially supported by a FPU fellowship by the Spanish Government.

Once I finished my PhD, I moved to the prestigious <u>Johann Bernoulli Institute for Mathematics and Computing Science</u> at the <u>University of Groningen</u> (The Netherlands) where I could work with *Prof. Roel Verstappen* for more than 2 years. This was financially supported by a Postdoctoral fellowship Beatriu de Pinós (see *"Grants and scholarships obtained"*) by the Generalitat de Catalunya. After this post-doctoral stay I kept a fruitful international collaboration with several common research projects and master and PhD students. One of these projects was funded by the 7th framework programme of the European Commission (FP7) as a leader researcher (see Research Project #15 in *"Participation in Research Projects"*). Other examples of this collaboration are the list of common publications (see the references [8,9,23,33,46] in the list of *"Publications"* in *International Journals* and the references [83,84,85,111,128,150] in the list of *"Publications"* in *International Conferences*) and the short research stays during 2011, 2012, 2017, 2018 and 2022.

On the other hand, I also keep a very fruitful collaboration with the research group led by *Dr. Sci. Tatiana Kozubskaya* (in particular with *Dr.Sci.Andrey Gorobets*) at the <u>Keldysh Institute for Applied Mathematics</u> of the <u>Russian Academy of Sciences</u>. The extensive list of common publications (see the references [4-8,11,13,15,17,18,21,24,25,28,29,31-34,36,38,41,42,44,45,48,50, 52,53] in the list of *"Publications"* in *International Journals* and the references [80,85,86,88,90,92, 95,97,99,104,106,107,112-117,121,123,124-127,129,130136,138,139,140,144,148,156,158] in the list of *"Publications"* in *International Conferences*) and the short research stays during 2013, 2015 and 2017 are examples thereof. Finally, I participated in the Summer Program 2016, organized by the <u>Center for Turbulence Research</u> at <u>Stanford University</u>, resulting in a couple of publications (see reference [33] in *"Publications" in International Journals* and the references [83-85] in list of *"Publications" in International Conferences*).

13. May - July 2022: Stay at the <u>Johann Bernoulli Institute for Mathematics and Computing Science</u> at the <u>University of Groningen</u>, The Netherlands. *Person in charge of the Host institution: Prof. R.C.W.P. Verstappen, Professor in Computational Fluid Dynamics.* Duration: **3 months**

12. December 2018: Stay at the <u>Johann Bernoulli Institute for Mathematics and Computing Science</u> at the <u>University of Groningen</u>, The Netherlands. *Person in charge of the Host institution: Prof. R.C.W.P. Verstappen, Professor in Computational Fluid Dynamics.* Duration: **3 weeks**

11. July 2017: Stay at the <u>Keldysh Institute for Applied Mathematics</u> of the <u>Russian Academy of Sciences</u>, Russia. *Person in charge of the Host institution: Dr. Sci. Tatiana Kozubskaya, head of the Computational Aeroacoustics Laboratory.* Duration: **1 month**

10. February – June 2017: Stay at the <u>Johann Bernoulli Institute for Mathematics and Computing Science</u> at the <u>University of Groningen</u>, The Netherlands. *Person in charge of the Host institution: Prof. R.C.W.P. Verstappen, Professor in Computational Fluid Dynamics.* Duration: **3.5 months**

9. June - July 2016: Participation in the CTR Summer Program 2016 at the <u>Center for Turbulence Research</u> (CTR), <u>Stanford University</u>, USA. Duration: **1 month**

8. February - June 2015: Stay at the <u>Keldysh Institute for Applied Mathematics</u> of the <u>Russian Academy of Sciences</u>, Russia. *Person in charge of the Host institution: Dr. Sci. Tatiana*

Kozubskaya, head of the Computational Aeroacoustics Laboratory. Duration: **3.5 months**

7. March - June 2013: Stay at the Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences, Russia. *Person in charge of the Host institution: Dr. Sci. Tatiana Kozubskaya, head of the Computational Aeroacoustics Laboratory.* Duration: **3.5 months**

6. July - October 2012: Stay at the Johann Bernoulli Institute for Mathematics and Computing Science at the University of Groningen, The Netherlands. *Person in charge of the Host institution: Dr. Ir. R.C.W.P. Verstappen, Assistant Professor in Computational Fluid Dynamics.* Duration: **4 months**

5. December 2011 - March 2012: Stay at the Johann Bernoulli Institute for Mathematics and Computing Science at the University of Groningen, The Netherlands. *Person in charge of the Host institution: Dr. Ir. R.C.W.P. Verstappen, Assistant Professor in Computational Fluid Dynamics.* Duration: **4 months**

4. January 2007 - June 2009: Postdoctoral Researcher at the Department of Mathematics and Computing Science at the University of Groningen, The Netherlands. Granted by a Postdoctoral fellowship Beatriu de Pinós by the Generalitat de Catalunya. *Person in charge of the Host institution: Dr. Ir. R.C.W.P. Verstappen, Assistant Professor in Computational Fluid Dynamics.* Duration: **2 years and 5.5 months (29.5 months)**

3. July 2006 Stay at the Department of Mathematics and Computing Science at the University of Groningen, The Netherlands. *Person in charge of the Host institution: Dr. Ir. R.C.W.P. Verstappen, Assistant Professor in Computational Fluid Dynamics.* Duration: **1 month**

2. June 2005 - July 2005 Stay at the Mechanical and Aerospace Engineering Department at the University of California, Los Angeles (UCLA), USA. *Person in charge of the Host institution: Prof. John Kim, Professor in Computational Fluid Dynamics.* Duration: **2 months**

1. May 2004 - June 2004 Stay at the Department of Mathematics and Computing Science at the University of Groningen, The Netherlands. *Person in charge of the Host institution: Dr. Ir. R.C.W.P. Verstappen, Assistant Professor in Computational Fluid Dynamics*. Duration: **2 months**

Organization of scientific international meetings

2024: **Co-organizer** of the mini-symposium: "*Reconciling physical fidelity, robustness and efficiency in computational fluid dynamics*" in the Ninth European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2024), June 3-7, 2024, Lisbon (Portugal).

2024: **Co-organizer** of the mini-symposium: "*Advanced parallel algorithms for extreme-scale simulations*" in the Ninth European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2024), June 3-7, 2024, Lisbon (Portugal).

2024: **Co-organizer** of the mini-symposium: "*Numerical methods for interface-resolved multiphase flows*" in the Ninth European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2024), June 3-7, 2024, Lisbon (Portugal).

2023: **Co-organizer** of the mini-symposium: *"Physics-compatible numerical methods for fluid flows"* in the 14th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements (ETMM14), September 6-8, 2023, Barcelona.

2022: **Co-organizer** of the mini-symposium: "*Discrete conservation properties for fluid flows: from fundamentals to applications*" in the Eighth European Conference on Computational Fluid Dynamics, ECCOMAS CFD 2022, June 5-9, 2022, Oslo (Norway).

2022: **Co-organizer** of the mini-symposium: "*Advanced HPC algorithms for large-scale simulations*" in the Eigth European Conference on Computational Fluid Dynamics, ECCOMAS CFD 2022, June 5-9, 2022, Oslo (Norway).

2022: **Co-organizer** of the mini-symposium: "*Advanced large-eddy simulation-based techniques for complex turbulent flows*" in the Eighth European Conference on Computational Fluid Dynamics, ECCOMAS CFD 2022, June 5-9, 2022, Oslo (Norway).

2020: **Co-organizer** of the mini-symposium: "*Discrete conservation properties in CFD*" in the 8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020), July 19–24, 2020, Paris, France (postponed to January 2021 due to COVID19 pandemic).

2020: **Co-organizer** of the mini-symposium: "*Advanced techniques for large-eddy simulation of turbulence in near-wall regions*" in the 8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020), July 19–24, 2020, Paris, France (postponed to January 2021 due to COVID19 pandemic).

2018: **Co-organizer** of the mini-symposium: "*Advanced models for large-eddy simulation of turbulent flows*" in the Seventh European Conference on Computational Fluid Dynamics, ECCOMAS CFD 2018, June 11-15, 2018, Glasgow (UK).

2016-2017: **Organizer** of the seminar "*Mathematical foundations of Computational Fluid Dynamics*" at the School of Mechanical and Aeronautical Engineering at the Technical University of Catalonia.

2014: **Co-organizer** of the mini-symposium: "*Advanced models for large-eddy simulation and regularization of turbulent flows*" in the Sixth European Conference on Computational Fluid Dynamics, ECCOMAS CFD 2014, July 20-25, 2014, Barcelona.

2012: **Invitation to the workshop** "*Connections Between Regularized and Large-Eddy Simulation Methods for Turbulence*" (12w5063) near Calgary (Canada) during summer 2012. The primary objective of this workshop was to bring together mathematicians working on regularized models for turbulence and the most active and prominent mathematicians, fluid mechanicians, physicists, and computational scientists working on advanced, cutting edge LES methods.

2010: **Co-organizer** of the mini-symposium: "*Regularization modeling of incompressible flows*" in the Fifth European Conference on Computational Fluid Dynamics, ECCOMAS CFD 2010, June 14-17, 2010, Lisbon.

Commissions of trust

2024: Member of the scientific committee of the In *Platform for Advanced Scientific Computing (PASC24)*, Zurich (Switzerland) June 2024.

2024: Member of the scientific committee of the In *International Conference on Supercomputing (ICS 2024)*, Kyoto (Japan) June 2024.

2024: Member of the scientific committee of the In *ERCOFTAC Workshop, Direct and Large-Eddy Simulations 14*, Erlangen (Germany) April 2024.

2023: Member of the scientific committee of the In *14th International ERCOFTAC symposium on engineering, turbulence, modelling and measurements (ETMM14)*, Barcelona, September 2023.

2022: Member of the scientific committee of the In *ERCOFTAC Workshop, Direct and Large-Eddy Simulations 13*, Udine (Italy) October 2022.

2022: Member of the scientific committee of the *Sixth International Conference on Future Networks and Distributed Systems* (ICFNDS 2022), 15-16 December, Tashkent, Uzbekistan.

2021-present: Member of the Access Committee to RES (Spanish Supercomputing Network) - Engineering and Mathematics.

2021: Member of the scientific committee of the *Fifth International Conference on Future Networks and Distributed Systems* (ICFNDS 2021), 15-16 December, Dubai (UEA).

2020: Member of the scientific committee of the *Fourth International Conference on Future Networks and Distributed Systems* (ICFNDS 2020), 26-27 November, San Petersburg (Russia).

2019: Member of the scientific committee of the *Third International Conference on Future Networks and Distributed Systems* (ICFNDS 2019), 1-2 July, 2019, Paris (France).

2019: Member of the scientific committee of the In *ERCOFTAC Workshop, Direct and Large-Eddy Simulations 12*, Madrid (Spain) May 2019.

2018: Member of the scientific committee of the *Second International Conference on Future Networks and Distributed Systems* (ICFNDS 2018), June 26-27, 2018, Amman (Jordan).

2017: Member of the scientific committee of the *First International Conference on Future Networks and Distributed Systems* (ICFNDS 2017). July 19 - 20, 2017, Cambridge (UK).

2015-present: Member of the Scientific Committee of the ANEP (*Agencia Nacional de Evaluación y Prospectiva*) in the area of Mechanical, Naval and Aeronautical Engineering.

Major collaborations

2004-present: Prof. Roel Verstappen, Johann Bernoulli Institute for Mathematics and Computing Science at the University of Groningen (The Netherlands).

2008-present: Prof. Sci. Andrey Gorobets, Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences (Russia).

2012-present: Prof. Sci. Tatiana Kozubskaya, Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences (Russia).

2014-present: Dr. Hao Zhang, Southeast University (China).

2015-present: Dr. Miller Zambrano, School of Science and Technology - Geology Division, University of Camerino (Italy).

2016-present: Dr. Ricard Borrell, Barcelona Supercomputing Center, Barcelona.

2016-present: Prof. Hans Kuerten, Department of Mechanical Engineering, Technische Universiteit Eindhoven (The Netherlands).

2018-present: Dr. Firas Dabbagh, Department of Particulate Flow Modelling at Johannes Kepler University Linz (Austria).

2018-present: Prof. Gennaro Coppola, Dipartimento di Ingegneria Industriale, Università degli Studi di Napoli Federico II (Italy). Dr. Francesco Capuano and

2018-present: Prof. Francesco Capuano, Fluid Mechanics Department, Universitat Politècnica de Catalunya (UPC)

2018-present: Dr. Ed Komen, Team Manager Computational Physics 4 Solutions, Nuclear Research & consultancy Group (NRG) (The Netherlands).

2023-present: Dr. Valeriu Codreanu, Head of High-Performance Computing and Visualization at SURF (The Netherlands)

2023-present: Dr.ir. B. Sanderse, Group leader at the National Research Institute for Mathematics and Computer Science (CWI) (The Netherlands)

- **Invitation** to the Institute of Numerische Methoden in der Luft- und Raumfahrttechnik (NML) at Universität der Bundeswehr München, Germany. (PDF presentation with movies) (PDF presentation without movies)

- **Invitation** to give a lecture to the workshop HPCSIM Frontiers of High-Performance Computing in Modeling and Simulation, Padova, Italy, September 2023.

- **Invitation** to the National Research Institute for Mathematics and Computer Science (CWI) at Amsterdam Science Park,The Netherlands, January 2023. (PDF presentation with movies) (PDF presentation without movies)

- **Invitation** to give a series of lectures about *new turbulence modeling techniques for hybrid RANS-LES* at the Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences, Russia. (postponed due to COVID pandemic and re-scheduled to 2022).

- **Invitation** to the Numerical Analysis and Scientific Computing group at the University of Pittsburgh, USA. January. (PDF presentation) (PDF presentation without movies)

- **Invitation** to the 2nd High-Fidelity Industrial LES/DNS Symposium, Toulouse, France, September 2021. (PDF presentation) (PDF presentation without movies)

- **Invitation** to the Johann Bernoulli Institute for Mathematics and Computing Science at the University of Groningen, The Netherlands. (PDF presentation: encrypted with gpg - contact me)

- **Invitation** to Dipartimento di Ingegneria Industriale at the Università degli Studi di Napoli Federico II, Italy. April 2019 (PDF presentation with movies) (PDF presentation without movies)

- **Invitation** to the School of Mathematics and Computational Science at the Tsinghua University, China. November 2018. (PDF presentation1) (PDF presentation 2)

- **Invitation** to the Hunan Key Laboratory for Computation and Simulation in Science of the Engineering School of Mathematics and Computational Science at the Xiangtan University, China. November 2018. (PDF presentation1) (PDF presentation 2)

- **Invitation** to give a series of lectures about *Large-Eddy Simulation modeling* at the Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences, Russia. July 2017.

- **Invitation** to the Fourth International Workshop Computational Experiment in AeroAcoustics, Svetlogorsk, Russia, September 2016. (PDF presentation)

- **Invitation** to participate in the CTR Summer Program 2016 at the Center for Turbulence Research (CTR), Stanford University, USA. July 2016.

- **Invitation** to give a series of lectures about *turbulence modeling* at the Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences, Russia. February 2015.

- **Invitation** to give a series of lectures about *numerical techniques for direct numerical simulations of turbulent flows* at the Keldysh Institute for Applied Mathematics of the Russian Academy of Sciences, Russia. February 2015.

- **Invitation** to the Third International Workshop Computational Experiment in AeroAcoustics, Svetlogorsk, Russia, September 2014. (PDF presentation)

- **Invitation** to the Connections Between Regularized and Large-Eddy Simulation Methods for Turbulence, Workshop at BIRS, Vancouver, Canada, May 2012. (PDF presentation)

- **Two invitations** to the Heat and Mass Transfer Technological Center during spring 2008 and 2009. As a postdoctoral researcher at the University of Groningen I was invited at the Heat and Mass Transfer Technological Center to give some lectures about "*Navier-Stokes equations and Turbulence Modeling*".

Other credits

- **Guest Editor** of the journal Energies for the special issues: Applied Mathematics and Numerical Methods of Fluid Mechanics and Turbulence Modeling (2022-2023) and Large-Eddy Simulations of Turbulent Flows (2019).

- **Reviewer** of the following international journals: International Journal of Heat and Mass Transfer, Physics of Fluids, Journal of Fluid Mechanics, Computers and Fluids, Journal of Scientific Computing, International Journal of Thermal Sciences, Heat Transfer Engineering, European Journal of Mechanics / B Fluids, Ships and Offshore Structures, AIAA Journal, ...

- **OpenSource Alg4CFD library**: Alg4CFD is a MATLAB library aimed at teaching CFD and the algebraic analysis of the discrete Navier-Stokes equations. It was originally developed to perform the computations of Ref.[40] (see "*International Journal Papers*") and later modified for educational purposes. https://bitbucket.org/nvalle/alg4cfd

- **OpenAccess to DNS data**: Since 2015, I have created and maintained the OA database with the most relevant DNS results (references are listed in "*International Journal Papers*"):

  https://www.cttc.upc.edu/downloads/MC_RA2_4e9_FR5_24 [43,49]
  https://www.cttc.upc.edu/downloads/RBC_lowPr [42]
  https://www.cttc.upc.edu/downloads/BFS_Ret395_ER2 [38]
  https://www.cttc.upc.edu/downloads/DHC_Ra1_2e11 [34,43]
  https://www.cttc.upc.edu/downloads/RBC [31,32,41]
  https://www.cttc.upc.edu/downloads/DuctFlow/ [28]
  https://www.cttc.upc.edu/downloads/SqCyl22K [25]
  https://www.cttc.upc.edu/downloads/DHC_AR4_2Dvs3D [1,3,6,7]

- **YouTube** channel: https://www.youtube.com/user/FXTrias with more than 125k views. Most popular video correspond to the DNS simulation around a square cylinder at Re=22000 (>100k views) which is one of the most popular videos about turbulence.