

Alessandro Coclite, PhD

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Alessandro Coclite received his PhD from the Politecnico di Bari in 2015. Since 2021 is a member of *Gruppo Nazionale per il Calcolo Scientifico* (GNCS) of *Istituto Nazionale di Alta Matematica* (INdAM).

Current Employment

- Politecnico di Bari** **Bari (IT)**
 - Researcher, *Dipartimento di Ingegneria Elettrica e dell'Informazione* JAN 2021 – Present
 - Assistant Professor in Numerical Analysis (MAT/08).

Previous Employment

- Università della Basilicata** **Potenza (IT)**
 - Senior PostDOC, *School of Engineering* MAR 2019 – DEC 2020
 - Development of numerical models for optimization of two-strokes engines for aeronautical applications.
- University of Bristol** **Bristol (UK)**
 - Senior Research Associate, *School of Earth Science* SEP 2018 – FEB 2019
 - Development of numerical models for the simulation of multiphase flow in porous media via Lattice-Boltzmann–Immersed Boundary techniques.
- Italian Institute of Technology** **Genova (IT)**
 - PostDOC, *Laboratory of nanotechnology for precision medicine (nPMed)* JUN 2015 – AUG 2018
 - Development of numerical models for the simulation of micro- and nano-constructs for drugs delivering in capillary flows via Lattice-Boltzmann–Immersed Boundary techniques.
 - Advisor: Prof. P. DECUZZI.
- Politecnico di Bari** **Bari (IT)**
 - Junior PostDOC, *Dipartimento di Ingegneria Meccanica (DMMM)* JAN 2015 – JUN 2015
 - Development of numerical models for the simulation of rigid particle transport in low Reynolds number flows.
 - Advisor: Prof. Ing. G. PASCAZIO.
- Technische Universität München** **Munich (DE)**
 - Visiting PhD Fellow, *Lehrstuhl für FlugAntriebe (LEA)* NOV 2013 – JUN 2014
 - Development of numerical models for the simulation of scramjet combustion chambers through the Flamelet Progress Variable framework.
 - Supervisor: Prof.-Ing. Oskar J. HAIDN.
- Politecnico di Bari** **Bari (IT)**
 - PhD Fellow, *Mechanical Engineering (Fluid Dynamics)* JAN 2012 – DEC 2014
 - Development of numerical models for the simulation of non-premixed subsonic and supersonic flame in the FPV framework using a joint-SMLD presumed PDF modelling.
 - Tutors: Prof. Ing. P. DE PALMA, Prof. Ing. G. PASCAZIO.

Education

Academic Qualifications

- **Academic National Qualification** **09/A1**
II degree, Scientific National Qualification (Fluid Dynamics) *May 2021*
VI Quarter ASN 2018

- **Politecnico di Bari** **Bari (IT)**
PhD degree, PhD in Mechanical Engineering (Fluid Dynamics) *Mar 2015*
PhD Thesis: Flamelet/Progress-Variable modelling of non-premixed turbulent combustion.
Description: Development of numerical models for the simulation of non-premixed subsonic and supersonic flame in the FPV framework using a joint-SMLD presumed PDF modelling.
Tutors: Prof. Ing. P. De Palma; Prof. G. Pascazio.
Referees: D. Cecere, PhD; Prof. M. Ihme.

- **Università degli Studi di Bari** **Bari (IT)**
Master Degree, Theoretical Physics (summa cum laude, 110/110 cum laude) *Sep 2011*
Master Thesis: Development of a new Lattice Boltzmann Method for the simulation of liquid vapor systems.
Description: The thesis explored the validity boundaries of the LBM algorithm in the simulation of a Van Der Waals inviscid fluid. It is proposed a new technique for the discretization of the Laplacian operator considering a 9-points computational molecule (stencil) in order to increase the accuracy of the numerical scheme.
Tutors: A. Lamura, PhD; Prof. G. Gonnella.
Referee: Prof. Ing. G. Pascazio.

- **Università degli Studi di Bari** **Bari (IT)**
Bachelor Degree, Physics (97/110) *Sep 2009*
Bachelor Thesis: A simple model of N coupled oscillators to simulate Josephson's junction.
Description: The thesis studies and develops a model of simple harmonic and un-harmonics oscillators coupled together to simulate the resonance phenomena of super-conductivity typical in Josephson's junction.
Tutors: Prof. S. Stramaglia.
Referee: Prof. G. Gonnella.

Advanced Schools

- **Paul Langevin Centre** **Aussois (FR)**
Aerospace Thematic Workshop 2013 *APR 2013*
This conference is the fourth of a cycle of conferences dedicated to the fundamental issues in the scientific disciplines relevant to aeronautics and space development.

- **Politecnico di Bari** **Bari (IT)**
Interpolytechnics school of Bioengineering *DEC 2012*
The Interpolytechnic fall school in Bioengineering pursues advances in knowledge, technologies and products for human and environmental issues at large, encompassing health and food sectors.

- **CINECA** **Rome (IT)**
Advanced school of parallel computing @ CASPUR *SEP 2012*

High Performance Computing (HPC) is widely used in many areas of science, engineering and industry to tackle problems that are very compute or data-intensive. The Summer School on Advanced Computing is an intense, 10 day, graduate level course in HPC, with the objective of providing the participants with the skills to program and exploit modern parallel computing systems to solve computational problems.

Politecnico di Bari

Bari (IT)

- *Collective Intelligence: Theories and Applications*

SEP 2019

The main aim of this Summer School is to provide an updated overview of the topic, both on theories and applications, according to a multidisciplinary perspective. To pursue this goal, the School offers a collection of topical lectures in multiple fields, given by leading international scholars from high-ranked academia and research centers.

Technical and Personal skills

- **Languages:** Italian (Mother tongue). English (Fluent).
- **Programming Languages:** Proficient in C, C++, ForTran, Matlab TeX.
- **Industry Software Skills:** Mathematica (Advanced), Matlab (Advanced), Comsol (Intermediate), Fluent–Ansys (Advanced), Most MS Office products (Advanced).

Teaching

- Second Semester 2020-2021, Numerical Analysis (60 Hrs) for Computer Engineering and Telecommunication – Bachelor degree @ PoliBA.
- Second Semester 2019-2020, Advanced Numerical Techniques for Engineering Applications (30 Hrs) Doctoral School @ UniBAS.
- First Semester 2015-2016, Numerical Fluid Dynamics (10 Hrs) for Mechanical Engineering – Master degree @ PoliBA;
- First Semester 2014-2015, Teaching Assistant for the Advanced Fluid Machinery course (10 Hrs) within Mechanical Engineering – Master degree @ PoliBA;
- First Semester 2013-2014, Teaching Assistant for the Advanced Fluid Machinery course (10 Hrs) within Mechanical Engineering – Master degree @ PoliBA;
- First Semester 2012-2013, Teaching Assistant for the Advanced Fluid Machinery course (10 Hrs) within Mechanical Engineering – Master degree @ PoliBA.

Master and Bachelor Degree Thesis supervised

- D. Rotolo, 2021, Modelli di interazione fluido/struttura per la simulazione della deformazione cellulare; Politecnico di Bari, Dipartimento di Meccanica, Matematica e Management.
- S. Albergo, 2019, Energy transfer in linear elastic system; Politecnico di Bari, Dipartimento di Meccanica, Matematica e Management.
- A. Tiozzo, 2017, Computational models for nanoparticles transport in the vascular system; Politecnico di Milano, Dipartimento di Matematica.
- L. Caló, 2015, Numerical simulation of a hydrogen-air diffusive flame with the SMLD Flamelet/Progress Variable approach; Politecnico di Bari, Dipartimento di Meccanica, Matematica e Management.
- A. Todisco, 2015, Simulation of incompressible flows with a Lattice Boltzmann Method; Politecnico di Bari, Dipartimento di Meccanica, Matematica e Management.
- G. D'Alessandro, 2014, Simulation of the flow past a cylinders array through a Lattice Boltzmann

Method; Politecnico di Bari, Dipartimento di Meccanica, Matematica e Management.

- V. Panessa, 2014, Analysis of the solid wall boundary conditions in an incompressible Lattice Boltzmann Method; Politecnico di Bari, Dipartimento di Meccanica, Matematica e Management.

Oral communication and Conference talks

- 20-12-2012 · Bari χ -mas Theory Workshop, Bari (IT)
- 11-06-2013 · Communication on LBM: theory and applications, Bari (IT)
- 01-07-2013 · Communication at EuCASS 2013, Munich (DE)
- 17-09-2013 · Communication at AIMETA 2013, Torino (IT)
- 10-12-2013 · Talk on the role of the PDF in non-premixed combustion evaluations through FPV models at LFA (TUM), Munich (DE)
- 12-05-2014 · Talk on an SMLD joint-PDF FPV-model simulation of a scramjet combustion chamber at LFA (TUM), Munich (DE)
- 05-06-2014 · Seminar on the combustion modelling at CIRA, Capua (IT)
- 15-09-2014 · Communication at EFMC10 2014, Copenhagen (DEN)
- 06-12-2014 · Communication at First Score@PoliBa, Bari (IT)
- 22-12-2014 · Bari χ -mas theory workshop 2014, Bari (IT)
- 09-12-2014 · ERCOFTAC pilot center research briefing, Rome (IT)
- 25-03-2015 · Communication at GAMM 2015, Lecce (IT)
- 19-04-2015 · Communication at Coupled Problems 2015, Venezia (IT)
- 6-11-2016 · Introduction to Lattice Boltzmann Methods at PoliBA, Bari (IT)
- 22-12-2015 · Bari χ -mas theory workshop 2015, Bari (IT)
- 26-07-2016 · Communication at WCCM XII, Seoul (Kr)
- 16-09-2016 · Communication at SIMAI, Milan (IT)
- 21-10-2016 · Computational and Theoretical nanomedicine workshop, Genova (IT)
- 22-12-2016 · Bari χ -mas theory workshop 2016, Bari (IT)
- 25-01-2017 · Seminar at the physical science department, Graz (AU)
- 12-06-2017 · Communication at Coupled Problems 2017, Rhodes (GR)
- 30-09-2019 · Invited Communication at Bio-mechanics of living systems from cells to organisms 2019, Oslo (NR)
- 30-07-2021 · Communication at NumHyp 2021, Trento (IT)
- 25-08-2021 · Communication at ICTAM 2021, Milano (IT)
- 28-09-2021 · Communication at MCHBS 2021, Rome (IT)
- 13-10-2021 · Invited talk at Dipartimento di Chimica, Materiali Ingegneria Chimica "Giulio Natta" Politecnico di Milano, Milano (IT)
- 16-11-2021 · Invited talk at Giornata INDAM, "Matematica e Industria: dalle ricerche di base alle applicazioni", Unità INDAM Politecnico di Bari, Bari (IT)
- 18-11-2021 · Invited talk at Dipartimento di Strutture, Università, Napoli (IT)

Participation in editorial committees of international journals

- Jan 2021 – Present · Topic Editor of Energies MDPI

Founded Projects and Grants

- Mar 2020 – Founding of the project proposal 3E75111F "Emodinamica in microchip artificiali per lo studio della trombosi" within POR Puglia FESR FSE 2014-2020 – Asse X - Azione 10.4 – Atto Dirigenziale 162/DIR/2019/00057 "Research for Innovation" (REFIN).

Publications

International Conference Papers

- M. Di Renzo, A. Coclite, M.D. de Tullio, P. De Palma, G. Pascazio, LES of the Sandia Flame D Using an FPV Combustion Model, *Energy Procedia*, 82, 402-409, 2015, issn "1876 – 6102", doi "[http : //dx.doi.org/10.1016/j.egypro.2015.11.824](http://dx.doi.org/10.1016/j.egypro.2015.11.824)", url "[http : //www.sciencedirect.com/science/article/pii/S1876610215025849](http://www.sciencedirect.com/science/article/pii/S1876610215025849)"
- A. Coclite, L. Cutrone, P. De Palma, G. Pascazio, Numerical investigation of high-pressure combustion in rocket engines using flamelet/progress-variable models, 53rd AIAA Aerospace Sciences Meeting, AIAA 2015-1109, 2015, doi 10.2514/6.2015 – 1109
- D. Laera, A. Coclite, S. M. Camporeale, G. Pascazio, Numerical Investigation of Thermo-Acoustic Combustion Instability of High-Pressure Combustion in Rocket Engines, *International Society for Air-Breathing Engines Series*, 22, 20206, 2015
- A. Coclite, G. Pascazio, L. Cutrone, P. De Palma, The role of presumed probability density functions in the simulation of nonpremixed turbulent combustion, *EUCASS Proceedings Series*, 2016, 8, 353-374, doi 10.1051/eucass/201608353, url [http : //adsabs.harvard.edu/abs/2016EUCAS...8..353C](http://adsabs.harvard.edu/abs/2016EUCAS...8..353C), Provided by the SAO/NASA Astrophysics Data System

Books and Monographs

- P. Decuzzi, A. Coclite, A. Lee, A. L. Palange, D. Di Mascolo, C. Chiappini, H. Santos, M. L. Coluccio, G. Perozziello, P. Candeloro, E. Di Fabrizio, F. Gentile, Nano-Particles for Biomedical Applications, *The Springer Handbook of NanoTechnology by Springer-Verlag Berlin Heidelberg*, 2017, pages "643-691", chapter "21", doi "10.1007/978 – 3 – 662 – 54357 – 3_21", issn "2522 – 8692", isbn "978 – 3 – 662 – 54357 – 3"
- A Cervadoro, A. Coclite, D. Di Mascolo, M. Ferreira, A. L. Palange, R. Palomba, R. Pereira, P. Decuzzi, Smart nanoconstructs for theranostics in cancer and cardiovascular diseases in *Core-Shell Nanostructures for Drug Delivery and Theranostics* edited by Woodhead Publishing Series in Biomaterials, 2018, pages "297-321", doi 10.1016/B978 – 0 – 08 – 102198 – 9.00010 – 7, isbn 978 – 0 – 08 – 102198 – 9, url <http://www.sciencedirect.com/science/article/pii/B9780081021989000107>

Journal Articles

- [1] Maria Faruoli, Alessandro Coclite, Annarita Viggiano, Paolo Caso, and Vinicio Magi. “A Comprehensive Numerical Analysis of the Scavenging Process in a Uniflow Two-Stroke Diesel Engine for General Aviation”. In: *Energies* 14.21 (2021). ISSN: 1996-1073. URL: <https://www.mdpi.com/1996-1073/14/21/7361>.
- [2] Alessandro Coclite, Giuseppe Maria Coclite, and Domenico de Tommasi. “Capsules Rheology in Carreau-Yasuda Fluids”. In: *Nanomaterials* 10.11 (2020). ISSN: 2079-4991. DOI: <https://doi.org/10.3390/nano10112190>.
- [3] Alessandro Coclite, Sergio Ranaldo, Giuseppe Pascasio, and Marco D. de Tullio. “A Lattice Boltzmann dynamic-Immersed Boundary scheme for the transport of deformable inertial capsules in low-Re flows”. In: *Computers & Mathematics with Applications* 80.12 (2020), pp. 2860–2876. ISSN: 0898-1221. DOI: <https://doi.org/10.1016/j.camwa.2020.09.017>. URL: <http://www.sciencedirect.com/science/article/pii/S0898122120303795>.
- [4] Alessandro Coclite. “Vascular journey and adhesion mechanics of micro-sized carriers in narrow capillaries”. In: *Microvascular Research* 132 (2020), p. 104069. ISSN: 0026-2862. DOI: <https://doi.org/10.1016/j.mvr.2020.104069>. URL: <http://www.sciencedirect.com/science/article/pii/S0026286220301291>.
- [5] Federica Laurino, Alessandro Coclite, Annagiulia Tiozzo, Paolo Decuzzi, and Paolo Zunino. “A hierarchical Multiscale Model for Predicting the Vascular Behavior of Blood-Borne nanomedicines”. In: *International Journal for Multiscale Computational Engineering* 18.3 (2020). DOI: 10.1615/IntJMultCompEng.2020033358.
- [6] Alessandro Coclite, Maria Faruoli, Annarita Viggiano, Paolo Caso, and Vinicio Magi. “Liquid-Cooling System of an Aircraft Compression Ignition Engine: A CFD Analysis”. In: *Fluids* 5.2 (2020). ISSN: 2311-5521. DOI: <https://www.mdpi.com/2311-5521/5/2/71>. URL: 10.3390/fluids5020071.
- [7] Pietro Lenarda, Alessandro Coclite, and Paolo Decuzzi. “Unraveling the Vascular Fate of Deformable Circulating Tumor Cells Via a Hierarchical Computational Model”. In: *Cellular and Molecular Bioengineering* (2019). ISSN: 1865-5033. DOI: 10.1007/s12195-019-00587-y. URL: <https://doi.org/10.1007/s12195-019-00587-y>.
- [8] Alessandro Coclite and Alberto M. Gambaruto. “Injection of Deformable Capsules in a Reservoir: A Systematic Analysis”. In: *Fluids* 4.3 (2019). ISSN: 2311-5521. DOI: 10.3390/fluids4030122. URL: <https://www.mdpi.com/2311-5521/4/3/122>.
- [9] Valeria Lusi, Thomas L. Moore, Federica Laurino, Alessandro Coclite, Rui Perreira, Miguel Ferreira, Ilaria Rizzuti, Roberto Palomba, Paolo Zunino, Marti Duocastella, Shoshy Mizrahy, Dan Peer, and Paolo Decuzzi. “A tissue chamber chip for assessing nanoparticle mobility in the extravascular space”. In: *Biomedical Microdevices* 21.2 (2019), p. 41. ISSN: 1572-8781. DOI: 10.1007/s10544-019-0398-5. URL: <https://doi.org/10.1007/s10544-019-0398-5>.
- [10] D. Di Mascolo, A. Coclite, F. Gentile, and M. Francardi. “Quantitative micro-Raman analysis of microparticles in drug delivery”. In: *Nanoscale Advances* (2019). DOI: <https://doi.org/10.1039/C8NA00187A>. URL: <http://dx.doi.org/10.1039/C8NA00187A>.

- [11] A. Coclite, S. Ranaldo, M.D. de Tullio, P. Decuzzi, and G. Pascazio. “Kinematic and Dynamic Forcing Strategies for Predicting the Transport of Inertial Capsules Via A Combined Lattice Boltzmann Immersed Boundary Method”. In: *Computers & Fluids* 180 (2019), pp. 41–53. ISSN: 0045-7930. DOI: <https://doi.org/10.1016/j.compfluid.2018.12.014>. URL: <http://www.sciencedirect.com/science/article/pii/S0045793018304304>.
- [12] A. Coclite, G. Pascazio, M.D. de Tullio, and P. Decuzzi. “Predicting the vascular adhesion of deformable drug carriers in narrow capillaries traversed by blood cells”. In: *Journal of Fluids and Structures* 82 (2018), pp. 638–650. ISSN: 0889-9746. DOI: <https://doi.org/10.1016/j.jfluidstructs.2018.08.001>. URL: <http://www.sciencedirect.com/science/article/pii/S0889974618301944>.
- [13] Hilaria Mollica, Alessandro Coclite, Marco E. Miali, Rui C. Pereira, Laura Paleari, Chiara Manneschi, Andrea DeCensi, and Paolo Decuzzi. “Deciphering the relative contribution of vascular inflammation and blood rheology in metastatic spreading”. In: *Biomicrofluidics* 12.4 (2018), p. 042205. DOI: 10.1063/1.5022879. eprint: <https://doi.org/10.1063/1.5022879>. URL: <https://doi.org/10.1063/1.5022879>.
- [14] A. Coclite, H. Mollica, S. Ranaldo, G. Pascazio, M. D. de Tullio, and P. Decuzzi. “Predicting different adhesive regimens of circulating particles at blood capillary walls”. In: *Microfluidics and Nanofluidics* 21.11 (2017), p. 168. ISSN: 1613-4990. DOI: 10.1007/s10404-017-2003-7. URL: <https://doi.org/10.1007/s10404-017-2003-7>.
- [15] A. Coclite, M. D. de Tullio, G. Pascazio, and P. Decuzzi. “A combined Lattice Boltzmann and Immersed boundary approach for predicting the vascular transport of differently shaped particles”. In: *Computers & Fluids* 136 (2016), pp. 260–271. ISSN: 0045-7930. DOI: <http://dx.doi.org/10.1016/j.compfluid.2016.06.014>.
- [16] A. Coclite, L. Cutrone, M. Gurtner, P. De Palma, O.J. Haidn, and G. Pascazio. “Computing supersonic non-premixed turbulent combustion by an SMLD flamelet progress variable model”. In: *International Journal of Hydrogen Energy* 41.1 (2016), pp. 632–646. ISSN: 0360-3199. DOI: <http://dx.doi.org/10.1016/j.ijhydene.2015.10.086>. URL: <http://www.sciencedirect.com/science/article/pii/S0360319915025835>.
- [17] A. Coclite, G. Pascazio, P. De Palma, L. Cutrone, and M. Ihme. “An SMLD Joint PDF Model for Turbulent Non-Premixed Combustion Using the Flamelet Progress-Variable Approach”. In: *Flow, Turbulence and Combustion* 95.1 (2015), pp. 97–119. ISSN: 1573-1987. DOI: 10.1007/s10494-015-9609-1.
- [18] A. Coclite, G. Gonnella, and A. Lamura. “Pattern formation in liquid-vapor systems under periodic potential and shear”. In: *Phys. Rev. E* 89 (6 2014), p. 063303. DOI: 10.1103/PhysRevE.89.063303.

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