CURRICULUM VITAE

Curriculum Vitae of Mirko Gallo

Personal Information

Family name, first name : Gallo, Mirko.

Date of birth: April 12 1990

Nationality: Italian.

Current Position

2019- Post-Doc Researcher in Fluid Mechanics, Dipartimento di Ingegneria Meccanica e Aerospaziale, Dept. Sapienza Università di Roma, Italy.

Previous Position

2015-2019 Phd Student in Theoretical and Applied Mechanics, Dipartimento di Ingegneria Meccanica e Aerospaziale, Dept. Sapienza Università di Roma, Italy. Thesis title: Fluctuating Hydrodynamics model for homogeneous and Heterogeneous nucleation, tutor: Prof. Carlo Massimo Casciola. Evaluation: Ottimo cum laude.

Education

2012-2015 Master Degree in Civil Engineering, Hydraulic specialization. Thesis title: Cavitation bubble dynamics near solid walls: collapse and surface damage. Tutor: Prof. Carlo Massimo Casciola. Evaluation 110/110 cum laude.

2009-2012 Bachelor Degree in Civil Engineering, Evaluation: 110/110 cum laude.

Awards

2013 Autostrade per l'Italia Scholarship.

2015 Sapienza Excellence graduate 2014/2015.

Funding

2016 Sapienza Project: Fluctuating Hydrodynamics as a tool to investigate fluids at mesoscopic scale.

(PI Euro 1000)

2017 Sapienza Project: Continuum Rare event techniques for phase transitions in metastable system.

(PI Euro 1000).

2020 Sapienza-DIMA Fellowship: **ASSEMBLE** - A meSoScalE Model for heterogeneous vapor Bubble nucLEation.

(PI Euro 25177.10).

HPC Grants

2016 Iscra C Cineca: Bubble oscillations in an hydrogel confined system (PI 1 M core-hours on FERMI IBM).

2017 Iscra C Cineca: Forward flux sampling approach in Fluctuating Hydrodynamics to investigate vapor bubble nucleation. (PI 300 K core-hours on MARCONI HPC).

2018 Iscra C Cineca: *A Stochastic Model to address Phase Transition in Metastable Fluids*. (PI 400 K core-hours on MARCONI KNL).

2019 Iscra B Cineca: *Vapor bubble nucleation through diffuse interface modeling and fluctuating hydrodynamic simulations* . (Collaborator 10 M core-hours on MARCONI KNL).

2020 Prace: *BIMI Bubble dynamics from nanoscale Inception to Macroscale hydrodynamic Interaction*. (Collaborator 35 M hours on MARCONI m100.).

Workshops and Conferences

2015 CECAM “Superhydrophobicity, Bubble Stability and Heterogeneous Nucleation Workshop” Roma.

2016 CECAM “Hydrodynamic Fluctuations in Soft-Matter Simulations” Prato. Poster

2016 CECAM “Cavitation Modeling and Experiments” Preci. Talk.

2016 CINECA “Introduction to Marconi Cluster for users and developers” Roma.

2016 CECAM “MolSimEng2016” Milan. Poster

2017 WESSEX INSTITUTE “Multiphase Flow” Tallin. Talk.

2018 EUROMECH “Numerical simulations of flows with particles, bubble and droplets”. Venice Talk.

2018 SISSA “Sixth deal.II Users and Developers Workshop”. Trieste.

2018 EUROMECH “Efmc12 (The 12-th European Fluid Mechanics Conference)”. Vienna Talk.

2019 Polito **“**The Theory of Coarse-Graining and its Applications Towards the Modelling of Complex Fluids”

Turin.

2020 University of Brigthon "SWEP 2020 Surface wettability effects on Phase change phenomena " Brighton (Virtual Workshop).

Memberships

2018 Member of EUROMECH European Mechanics Society, Member of INDAM "Istituto Nazionale di Alta Matematica".

Reviewing Activities

2020 Physical Review E, Physical Review Letters, Applied Physics Letter, Physical Review Applied .

Teaching Activity

2016 - 2020 Teaching assistant at Sapienza Università di Roma.

Mathematical Analysis (Prof.ssa Maria Rosaria Lancia): Bachelor Degree in Civil-Engineering, Environmental Engineering, Aerospace Engineering.

Fluid Dynamics (Prof. Paolo Gualtieri) Bachelor Degree in Mechanical Engineering.

2021 Adjunct Professor of Differential Equations Temple University Rome Campus.

2020-2021 Adjunct Professor of Mathematical Analysis Aerospace Engineering.

Supervision of Graduate Students

Co-supervision of 10 Master student thesis.

Co-supervision of 2 PhD student.

International Project

Collaborator in the **ERC Advanced Grant** for the project **BIC (**Cavitation across scales: following Bubble from Inception to Collapse, agreement # 339446–BIC PI Prof. Carlo Massimo Casciola).

Collaborator in **ERC Proof-of-Concept** (2017 call) for developing the **INVICTUS** (IN VItro Cavitation Through UltraSound, proposal # 779751 PI Prof. Carlo Massimo Casciola).

Research Activity

Research activity focuses on mesoscale modeling of fluids, and it is framed in an multidisciplinary context involving fluid mechanics, statistical mechanics, applied mathematics, high-performance-computing and material science. In particular fluctuating hydrodynamics theory and phase field models. Such multiscale models combined with massively parallel numerical simulations allow to cope with a wide spectrum of physical phenomena (ranging from the molecular scale up to the hydrodynamic one), such as: phase transition in fluids, cellular membrane mechanics, alloy solidification, freezing and crystallization dynamics. Recently I was involved in a scientific project on “Viscous Flux in presence of fractal surfaces”, where the fractals walls show drug reduction as well as anomalous heat dissipation.

Pubblications

1) Magaletti, F., **Gallo, M**., Marino, L., & Casciola, C. M. (2015). “Dynamics of a vapor nanobubble collapsing near a solid boundary”. Journal of Physics 2015.

2) Magaletti, F., **Gallo, M**., Marino, L., & Casciola, C. M. “Shock-induced collapse of a vapor nanobubble near solid boundary” International Journal of Multiphase Flow 2016.

3) **Gallo, M**., Magaletti,F. & Casciola, C. M. “Fluctuating Hydrodynamics as a tool to investigate nucleation of cavitation bubbles” “International Journal of Computational methods and experimental measurements 2018.

4) **Gallo, M**., Magaletti,F. & Casciola, C. M. “Thermally activated vapor bubble nucleation: the Landau-Lifshitz/Van der Waals approach”. Physical Review Fluids 2018.

5) Chiara Scognamiglio, Francesco Magaletti, Yaroslava Izmaylov, **Mirko Gallo**, Carlo Massimo Casciola , Xavier Noblin. “The intimate acoustic signature of a micro-confined cavitation bubbles”. Soft Matter 2018.

6) **Gallo, Mirko**, Magaletti, Francesco, and Casciola, Carlo Massimo. "Phase Field/Fluctuating Hydrodynamics Approach for Bubble Nucleation." *Proceedings of the 10th International Symposium on Cavitation (CAV2018)*. Ed. Joseph Katz. ASME Press, 2018.

7) **Mirko Gallo**, Francesco Magaletti, Carlo Massimo Casciola. Phase Field/Fluctuating Hydrodynamics Approach for Bubble Nucleation. In Proceedings of the 10th International Symposium on Cavitation (CAV2018). Baltimore, Maryland, USA, May 14 – 16, 2018. Asme Press. Pag .873-878

8) **Gallo, M**., Magaletti,F. Cocco, D. & Casciola, C. M. “Nucleation and Growth dynamics of vapor bubbles”. To appear in Journal of Fluid Mechanics.

9) **Gallo, M**., Magaletti,F. & Casciola, C. M. “Heterogeneous bubble nucleation dynamics”. Journal of Fluid Mechanics.

10) Cefalo, M., Creo, S., **Gallo, M**., Lancia, M.R., Vernole, P. “Stokes Flow in 3D Fractal domains: Regularity results and numerical approximation”. Accepted.