Monday

8:45 – 9:00 **Welcome and introductions**
Prof. Demetrios T. Papageorgiou, Chair of the local organising committee
Prof. Tassos Karayiannis, Chair, MNF Conference Committee
Prof. Richard V. Craster, Dean, Faculty of Natural Sciences, ICL

9:00 – 10:00 **Invited Plenary**: **Prof. Detlef Lohse, University of Twente**
Physicochemical hydrodynamics of droplets out of equilibrium
Chair: **Dr Valeria Garbin, TU Delft**

10:00 – 10:30 Break

10:30 – 12:30 Three Parallel Sessions

Session 1A. Minisymposium: *Transport Phenomena on Superhydrophobic Surfaces I*
Chair: *Dr Toby L. Kirk, Oxford University*

10:30-10:50 Droplet self-propulsion on hemi-liquid and shaped liquid. (20)
G. McHale, G.G. Wells, R. Ledesma-Aguilar
10:50-11:10 Non-wetting droplets rolling down a gently inclined plane. (13)
O. Schnitzer, A.M. Davis, E. Yariv
11:10-11:30 Droplet mobility on nanohierarchical hydrophobic surfaces. (71)
J. Zhang, V. Singh, M.K. Tiwari
11:30-11:50 Effective slip for longitudinal flow over superhydrophobic surfaces with partially-filled grooves. (96) *D.G. Crowdy*
11:50-12:10 Rotation of a superhydrophobic cylinder in a viscous liquid. (90)
E. Yariv, M. Siegel
12:10-12:30 Giant slip flow enhanced by Marangoni stresses at a superhydrophobic air-water interface. (67) *D. Song, B. Song, G. Pan, H. Hu, J. Rothestein, C.-H. Choi*

Session 1B: *Experimental Approaches I*
Chair: Dr Monica Oliveira, University of Strathclyde

10:30-10:50 Measurement of flow field in evaporating sessile droplets (77).
Z. Che, H. Zhao, T. Wang
10:50-11:10 Three-dimensional reconstruction of vapor-liquid interface in micro grooved heat pipe (29). *F. Yu, Y. Yang, H. Pang*
11:10-11:30 Experimental study of flow structure and mass transfer in slug flow of immiscible liquids in serpentine channels (63).
A Kovalev, A. Yagodnitsyna, A. Bilsky
11:30-11:50 Ion concentration effect on induced-charge electro-osmosis. (48)
F. Huicheng, Z. Linggi, Z. Xin, L. Xingfeng, T.N. Wong
11:50:12:10 Water evaporation and salt crystallization in porous media. (65)
F. Cheng, R. Wui, C.Y. Zhao
12:10-12:30. Effect of surface wettability on bubble distribution in the backward-facing step turbulent flow field. (52)
X. Lv, W.-T. Wu, J. Lv, K. Mao, L. Gao, Y. Li

Session 1C: ***Micro and nano-engineered surfaces for single and two-phase heat transfer***
Chair: Dr Simone Mancin, University of Padova

10:30-10:50 Analysis of nonequilibrium gas flows induced by evaporation from porous surfaces. (60)
H. Imai, H. Matsumoto, Y. Yoshimoto, Z. Lu, T. Shu, I. Kinefuchi

10:50-11:10 On water pool boiling on microparticle coated surface. (127)
L. Doretti, F. Coletti, S. Mancin

11:10-11:30 Bubble growth and departure from an artificial cavity during flow boiling. (35)
D. Yang, A. Sergis, Y. Hardalupas

11:30-11:50 Submerged self-propulsion driven by the Leidenfrost effect. (72)
A Jonas, D. Gibson, D. Orejon, G. Duursma, K. Sefiane

11:50-12:10 Model of droplets' growth and coalescence during dropwise condensation. (84) *M. Mirafiori, M. Tancon, S. Bortolin, D. Del Col*

12:10-12:30 Wetting of binary mixtures on micro-textured surfaces. (73)
K. Al Baloushi, D. Orejon, K. Sefiane

12:30 – 13:30 Lunch Break

13:30 – 14:30 **Invited Keynote: Prof. John Thome, EPFL**
Modelling of flow boiling in microscale pin fin arrays
Chair: Prof. Christos Markides, Imperial College London

14:30 – 15:00 Break

15:00 – 17:00 Three Parallel Sessions

Session 2A. Minisymposium: ***Transport Phenomena on Superhydrophobic Surfaces II***
Chair: ***Prof. Marc Hodes (Tufts University)***

15:00-15:20 Optothermally driven Marangoni flow on superhydrophobic surfaces. (24)
A Gao, H.-J. Butt, W. Steffen, C. Schonecker

15:20-15:40 Flow and thermal resistances of superhydrophobic channels. (81)
S.D. Tomlinson, T.L. Kirk, D.T. Papageorgiou

15:40-16:00 Streamwise and transverse thermocapillary stress effects on heat transfer in a superhydrophobic microchannel. (69)
M. Mayer, G. Karamanis, T.L. Kirk, K. Remella, M. Hodes

16:00-16:20 Slip on surfactant-contaminated superhydrophobic gratings in laminar flows. (107) *F. Temprano-Coleto, S.M. Smith, F.J. Peaudecerf, J.R. Landel, F. Gibou, P. Luzzatto-Fegiz*

16:20-16:40 A fast and accurate boundary integral method for superhydrophobic flow computations. (12)
K. Sugita, S. Jiang, M. Siegel

Session 2B. Minisymposium: ***Computational Modelling Across the Scales: a mini-symposium dedicated to Prof. Jason Reese***
Chair: ***Prof. Duncan Lockerby, University of Warwick***

15:00-15:40 A seamless multiscale operator neural network for inferring bubble dynamics. (54) *George Em Karniadakis*
15:40-16:00 Jumping and hopping interfacial molecules: How do they influence wetting? (57) *S. Perumanath, M. Chubynsky, R. Pillai, M.K. Borg, J.E. Sprittles*
16:00-16:20 Non-equilibrium argon evaporation. (80) *Irina Graur*
16:20-16:40 Hydrodynamics of thermal capillary waves at the nanoscale. (50) *Y. Zhang, D. Lockerby, J.E. Sprittles*
16:40-17:00 Non-equilibrium transport of dense gases. (42) *Yonghao Zhang*

Session 2C: Boiling and condensation in microsystems
Chair: Prof. Dariusz Mikielewicz, Politechnika Gdanska

15:00-15:20 Experimental study of high heat flux removal based on subcooled flow boiling and micro-jet impingement in microchannels. (70) *V. Kuznetsov, A. Shamirzaev*
15:20-15:40 The influence of loop heat pipe evaporator porous structure parameters and charge on its effectiveness for ethanol and water as working fluids. (111) *Dariusz Mikielewicz, K. Blauciak*
15:40-16:00 Flow boiling of low GWP refrigirants inside a 2.5 mm ID horizontal smooth mini tube: R1234ze(E) vs. R513A. (18) *A. Diani, L. Rossetto*
16:00-16:20 Theoretical analysis of a sensor for evaluation of liquid film thickness of annular flows in microscale channels. (4) *V. Baptistella, V. Nascimento, G. Ribatski*
16:20-16:40 Analysis of flow pattern based mechanistic heat transfer model for flow boiling of CO2 inside horizontal micro-channels. (109) *L. Cheng, G. Xia*
16:40-17:00 Flow around a single non-spherical micron-sized particle in a channel with fluid injection. (74) *K. Volkov, V. Emelyanov*

Tuesday

8:30 – 9:30. **Invited Keynote: Prof. Koji Takahashi, Kyushu University**
Gas molecules at solid-liquid interfaces
Chair: Prof. Tassos Karayiannis, Brunel University

9:30 – 10:00 Break

10:00 – 12:00 Three Parallel Sessions

Session 1A. Minisymposium: ***Modelling fluid-particle and fluid-structure interactions in microscale systems I***
Chair: Dr Eric Keaveny, Imperial College London

10:00-10:20 Active (non-) particles: donuts, curved rods, and flexibility. (104)
Tom Montenegro-Johnson
10:20-10:40 Simulating suspensions of passive and active articulated bodies in Stokes flow. (53) *B. Delmotte, F. Balboa Usabiaga*
10:40-11:00 Collective dynamics of active filaments on spherical surfaces. (33)
T. Westwood, E. Keaveny
11:00-11:20 Slender phoretic theory of chemically active filaments. (87)
P. Katsamba, S. Michelin, T. Montenegro-Johnson
11:20-11:40 Spontaneous chiralization of polar active colloids. (30)
M. De Corato, I. Pagonabarraga, G. Natale
11:40-12:00 Active particles in a bulk fluid. (47)
Debasish Das

Session 1B: Mathematical & computational approaches (MD/kinetic theory)
Chair: Dr James Sprittles, University of Warwick

10:00-10:20 A continuum model of nanodrop spreading. (116)
M. Chubynsky, S. Perumanath, R. Pillai, M.K. Borg, J.E. Sprittles
10:20-10:40 Finding the point of no return: Understanding the onset of dynamical wetting failure. (44) *J. Keeler, J.E. Sprittles, D. Lockerby*
10:40-11:00 An atomistic-scale study of hypothermal non-equilibrium flow interactions at the gas-liquid interface via reactive molecular dynamics simulation. (85)
Z., Cui, J. Zhao, L. He, J. Zhang, D. Wen
11:00-11:20 Numerical investigation of rarefied gas flow past a confined circular cylinder. (45)
A. Singh, B. John, D. Emerson, X. Gu
11:20-11:40 A Boltzmann like kinetic description for dilute to semidilute nonhomogeneous polymer solutions. (82) *Shiwani Singh*

Session 1C: Heat transfer applications at micro and nano scales
Chair: Dr Francesco Coletti, Brunel University

10:00-10:20 Prediction of phonon mean free path in polycrystalline nanostructures based on mean square displacement. (11) *Takuma Hori*
10:20-10:40 Inkjet printing of microdroplet coalescence at heated substrates. (39) *M. Zhang, X. Chen, Z. Tao, L. Qiu*
10:40-11:00 Air-ferrofluid Taylor bubble flow as energy efficient coolant at low Reynolds number. (38) *M. Kole, R. Krishna Shah, S. Khandekar*
11:00-11:20 Multiscale computational modeling of quasistatic Leidenfrost drops. (100) *I. Chakraborty, M. Chubynsky, J.E. Sprittles*
11:20-11:40 Geometrical optimisation of microchannels subject to electro-osmotic flow. (115) *N. Suzzi, M. Lorenzini*
11:40-12:00 Measurements of interfacial temperature upon phase-change. (113) *Elizaveta Gatapova*

12:00 – 13:00 Lunch Break

13:00 – 15:00 Three Parallel Sessions

Session 2A: Biomedical flows
Chair: Prof. Ali Kosar, Sabanci University

13:00-13:20 Direction change of tumbling bacteria: a hydrodynamic model. (66) *M. Dvoriashyna, E. Lauga*
13:20-13:40 Microswimmers in anisotropic media. (117) *I. Tanasijevic, E. Lauga*
13:40-14:00 Stability of soft capsule pairs in inertial microfluidics. (98) *B. Owen, T. Krueger*
14:00-14:20 Hydrodynamic cavitation-based detection in a microfluidic device. (110) *I. Namli, S.S. Saraf, O. Kutlu, S. Cetinel, M. Ghorbani, A. Kosar*
14:20-14:40 Microfluidic DNA isolation with a magnetic platform. (122) *G. Kibar, B. Sariaslan, M. Yildiz, B. Usta, B. Cetin*
14:40-15:00 Human dermal microvascular endothelial cell response to laminar unidirectional flow. (105) *T. Polk, S. Schmitt, D. Long*

Session 2B: Mathematical & computational approaches – channel and tube flows
Chair: Prof. Nikos Pelekasis, University of Thessaly

13:00-13:20 Liquid film distribution around long bubbles in rectangular channels. (97)
M. Magnini, F. Municchi, I. El Melas, M. Icardi

13:20-13:40 Numerical study of two-phase flow in vertical microtubes: Adiabatic flow patterns. (10)
A. Sahar, J. Wissink, M. Mahmoud, M.S.A. Ishak, T. Karayiannis

13:40-14:00 The effect of isolated ridges and grooves on static menisci in rectangular channels. (32)
E. Johnstone, A. Hazel, O. Jensen

14:00-14:20 Numerical simulation on flow boiling heat transfer non R134a based functional fluids in a microchannel. (94) *R. Yang, Y. Wang, Y. Ding, Y. Li*

14:20-14:40 Numerical study on the core-annular flow in the presence of surfactants. (25)
A. Lytra, M. Vlachomitrou. N. Pelekasis

14:40-15:00 The effect of different carrier fluids on heat transfer in a microfluidic device. (16) *J. Mohamed, M. Spizzichino, G.P. Romano*

Session 2C: Mathematical & computational approaches - drops and films
Chair: Prof. Eugene Benilov, University of Limerick

13:00-13:20 Anomalous evaporation of sessile drops surrounded by saturated vapor, and condensation of vapor in a corner between two solids. (23) *E. Benilov*

13:20-13:40 Bridging the gap in bouncing dynamics. (37)
R. Cimpeanu, C. Galeano-Rios, P. Milewski, I. Baumann, A. MacEwen, D. Harris

13:40-14:00 Detailed thermal modelling of droplet assembly in nanoscale molten metal films. (114) *R. Allaire, L. Cummings, L. Kondic*

14:00-14:20 DC-electrokinetic behaviour of colloidal cylinders in the vicinity of a non-conducting wall. (125)
A. Atay, A. Beskok, B. Cetin

14:20-14:40 Investigating droplet impact dynamics by machine learning. (62)
M. Tembely, A. Dolatabadi, D. Vatillo, A. Soucemarianadin

15:00 – 15:30 Break

15:30 – 16:30. **Invited Keynote, Prof. Douglas H. Kelley, University of Rochester**
Microscale flows removing waste from the brain: Drivers, characteristics, and mysteries
Chair: Dr Sam Au, Imperial College London

Wednesday

9:00 – 10:00. **Invited Plenary: Prof. Lydia Bourouiba, MIT**
Unsteady fluid fragmentation
Chair: Prof. Demetrios T. Papageorgiou, Imperial College London

10:00 – 10:30 Break

10:30 – 12:30 Three Parallel Sessions

Session 1A. Minisymposium: ***Modelling fluid-particle and fluid-structure interactions in microscale systems II***
Chair: Dr Adam Townsend, Durham University

10:30-10:50 On the role of hydrodynamic interactions in the manupulation of elongated magnetic particles. (118) *Micheline Abbas, G. Bossis, P. Kuzhir*
10:50-11:10 Fluid-structure interactions in graphene nanohydrodynamics. (68) *Lorenzo Botto*
11:10-11:30 Non-Newtonian effects on particle and droplet dynamics in low Reynolds number shear flows. (99) *O. Tammisola, E. Chaparian, D. Izbassarov*
11:30-11:50 Viscoelasticity-induced ordering of particles in a straight microfluidic channel. (21) *G. D'Avino, P.L. Maffettone*
11:50-12:10 Characterisation of bio-particles under extensional flow using optimised microfluidic devices. (128) *K. Zografos, Y. Liu, J. Fidalgo, C. Duchene, C. Quintard, T. Darnige, V. Filipe, S. Huille, O. du Roure, A. Lindner, Monica Oliveira*

Session 1B: Nanofluids and applications
Chair: Prof. Masamichi Kohno, Kyushu University

10:30-10:50 Analysis on enhancement mechanism of convective heat transfer in a nanofluid. (8) *S. Hashimoto, M. Harada, Y. Higuchi, T. Matsunaga*
10:50-11:10 Slip characteristics of Ar simple liquid in nanochannel Couette flow. (46) *T. Zolotoukhina, S. Sugawara, T. Hayashi*
11:10-11:30 Coalescence in surface nanobubbles initiates via gas layer formation. (19) *S. Nag, Y. Tomo, H. Teshima, K. Takahashi, M. Kohno*
11:30-11:50 Cavitation collapse of surface nanobubbles. (92) *D. Dockar, L. Gibelli, M.K. Borg*
11:50-12:10 Self-diffusivity of hard-sphere fluids in rough planar nanochannels. (34) *C. Corral-Casas, L. Gibelli, J. Li, M.K. Borg*
12:10-12:30 Multiscale modelling of intratumoural injection of nanofluid. (95) *G. Caddy, X. Yun Xu*

Session 1C: Mixing & design/Pumps and other devices, Nanofluids applications
Chair: Prof. Lixin Cheng, Sheffield Hallam University

10:30-10:50 Toward 100% yield of one-to-one particle encapsulation using dielectrophoretic particle alignment technique. (9)
K. Tatsumi, K. Mabuchi, R. Kuriyama, K. Nakabe

10:50-11:10 Water transport in boron nitride nanotube membranes. (76)
S. Mistry, R. Pillai, M.K. Borg

11:10-11:30 Investigation of fungal fermentation in a miniaturised liquid-solid-gas fluidised bed reactor. (121)
Y. Zhang, Y. Ling Ng, K. Goh, Y. Chow, V. Zivkovic

11:30-11:50 Numerical investigation of unsteady microscale flow in a spacer-filled membrane channel. (58)
H. Fadhila, J. Stafford, P. Davies

11:50-12:10 Particle migration of a nanofluid flow in a microchannel. (91)
A. Loh, G.M. Chen, B.K. Lim

12:10-12:30 Magnetic manipulations of Taylor flow of ferrofluid in microchannels. (36)
R.K. Shah, J.K. Drave, S. Khandekar

12:30 – 13:30 Lunch Break

13:30 – 14:30. **Invited Keynote: Prof. James E. Moore Jr, Imperial College London**
The roles of fluid flow in immune system function
Chair: Dr Matthew Borg, University of Edinburgh

14:30 – 15:00 Break

15:00 – 17:00 Three Parallel Sessions

Session 2A. Minisymposium: *Understanding disease transmission through micro-scale fluid dynamics*
Chair: Dr Radu Cimpeanu, University of Warwick

15:00-15:20 Understanding the fluid dynamics of airborne disease transmission from the microscale to the macroscale. (26) *Jesse Capecelatro*

15:20-15:40 A new airborne transmission model that quickly predicts the spatiotemporal infection risk in indoor spaces. (126)
K. Kaouri, I.M. Griffiths, Z. Lau, A. English, R. Gonzalez Farina, A. Ramage

15:40-16:00 Multimodality in droplet dispersion. (88) *Cathal Cummins*

16:00-16:20 Spatio-temporally resolved investigation of mask efficacy: CONFESS study. (103) *H. Davies, K.M. Alexander Ho, R. Epstein, A. Hogan, Y. Kabir, J. Rubin, G.Y. Shin, J. Reid, R. Torii, M. Tiwari, R. Balachandran, L. Lovat*

16:20-16:40 Decontamination of droplets containing biological or chemical material and possible implications for disease transmission. (55)
J. Landel, E. Butler, F.P. Conto, M. Etzold, S. Dalziel

16:40-17:00 Sunlight inactivation modelling of SARS-CoV-2 and implications for the fluid dynamics of disease transmission. (106)
P. Luzzatto-Fegiz, F. Temprano-Coleto, F. Peaudecerf, J. Landel, Y. Zhu, J. McMurry

Session 2B: Mathematical & computational approaches – acoustic effects, porous media, instabilities

Chair: Dr Barbaros Cetin, Bilkent University

15:00-15:20 Numerical simulation of acoustophoresis with acoustic and hydrodynamic interactions. (124) *H.N. Acikgoz, A. Atay, B. Cetin, M.B. Ozer*

15:20-15:40 Particle focusing via low and high frequency acoustic waves in a microfluidic chip. (123) *H.N. Acikgoz, A. Atay, M.A. Sahin, M.B. Ozer, B. Cetin*

15:40-16:00 Linear stability of ferrofluids in different configurations. (119) *S. Ferguson-Briggs*

16:00-16:20 The squeeze-film problem for a porous membrane with an open base. (86) *A. Mitchell, S. Wilson, B. Duffy*

16:20-16:40 Mathematical modeling of flow and fouling in pleated membrane filters. (89) *D. Persaud, M. Smirnov, D. Fong, P. Sanaei*

16:40-17:00 On optimizing the pleat packing density in a pleated filter cartridge. (93) *M. Smirnov, D. Persaud, D. Fong, P. Sanaei*

Session 2C: *Experimental Approaches II*

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Chair: Prof. Marco Lorenzini, University of Bologna

15:00-15:20 Simultaneous impact of multiple droplets on a solid surface. (28) *A. Goswami, Y. Hardalupas*

15:20-15:40 Liquid-liquid flow with non-Newtonian dispersed phase in a T-junction microchannel. (61) *A. Yagodnitsyna, A. Kovalev, A. Bilsky*

15:40-16:00 Evaluation of generalised flow patterns map for liquid-liquid two-phase flow in a small channel. (83) *M. Al-Azzawi, F.S. Mjalli*

16:00-16:20 Flow patterns inside surfactant-laden drops moving in a rectangular channel. (17) *N. Kovalchuk, M. Simmons*

16:20-16:40 Experimental studies of liquid displacement in microchannels with pure viscoelastic liquids. (31) *S.H. Hue, L. Chagot, P. Angeli*

16:40-17:00 Analytical modelling and experimental study of the dynamics of shear induced sloshing. (15) *T. Hossain, C. Rops*

17:00-17:15 Close of Conference. Profs Karayiannis & Papageorgiou