



UNIVERSITY OF THESSALY
Department of Mechanical Engineering

Marie-Curie Initial Training Network
MULTIFLOW
(Multiscale complex fluid flows and interfacial phenomena)

GENERAL SCOPE OF PROJECT

Understanding and controlling of interfacial phenomena in multiphase fluid dynamics remains one of the main challenges at the crossroad of Engineering, Physics and Applied Mathematics. Examples include film flows, spreading and dewetting of (complex) liquids including (nano)suspensions, polymer solutions, liquid crystals, colloids and biofluids. Such systems are central for technological advances in the chemical, pharmaceutical, environmental and food industries and are crucial for the development of microfluidics and nanostructuring. Based on the nature of the dominant mechanism, the scientific program will examine three generic classes of problems: from nano- to macroscale, these are dominated by contact forces, reaction-diffusion, and advection. They are also affected by phase transitions, capillarity, chemical reactions, complex rheology and self-structuring.

The strength of the network is its integration of all scientific disciplines, technical skills and expertise necessary to support the multi-scale nature of the envisaged research topics. The network fosters the mobility of a strong group of early-stage and experienced researchers through intense collaborations between different institutions, disciplines and industries. It also provides state-of-the-art interdisciplinary training by a well-organised set of summer schools/workshops and short instructional courses. Thus, it serves the dual purpose: (i) to create a multi-disciplinary, highly innovative and intersectorial training pool in the field of multi-scale interfacial fluid dynamics; (ii) to generate new tools and techniques for the theoretical-numerical-experimental investigation of such flows.

More information about the network can be found at the following site, which is still under development: <http://www.mpipks-dresden.mpg.de/~thiele/Multiflow>

JOB DESCRIPTION

Job Title: Research Associate / PhD Researcher (Marie-Curie ESR)

Project Title: Computational study of isothermal and non-isothermal film flow along non-flat walls

Department: Mechanical Engineering, University of Thessaly, Volos, Greece

Duration: 36 months

Expected starting date: July 2009 (by agreement with the researcher)

Application deadline: 15 April 2009

Project outline

Film flows are at the heart of many industrial applications, most notably in processes involving heat and/or mass transfer and in coating processes. A key ingredient of these problems at low and intermediate Reynolds numbers is the dynamics of the interface, which is dictated by two- or three-dimensional traveling coherent structures, called solitary waves. Frequently, the solid wall on which the film flows is not flat, either because of construction defects or intentionally in order to promote specific phenomena. Also, when the liquid is not isothermal, secondary flows develop because of the variation of surface tension at the interface with temperature (Marangoni convection).

The goal of the present project is the use of computer simulations to understand the combined effects of wall topography and Marangoni convection in liquid film flows. To this end, available in-house finite-

element codes will be modified to include the pertinent effects. Also, specialized commercial software (TransAT of ASCOMP, made available in the frame of the network) will be complementarily used, in close collaboration with the code developer. The researcher will spend the majority of her/his time in Volos, Greece. She/he will also be potentially involved in short-time visits to ASCOMP (Zurich), Imperial College (London), Technion (Haifa) and Universite Libre de Bruxelles, and will participate in a variety of educational and training events.

Requirements

This is a challenging and highly rewarding course of study and therefore the successful candidate should have the following qualifications:

- a Masters-level degree in Engineering, Physics or Applied Mathematics with high standard results;
- a good background in fluid mechanics and programming in Fortran;
- excellent communication skills and written/verbal knowledge of the English language;
- high autonomy and adaptability skills;

Eligibility

At the time of their appointment, applicants should:

1. be in the first 4 years (full-time equivalent) of their research careers, from the date of obtaining the degree which would formally entitle them to embark on a doctorate;
2. be of any nationality, except a national of Greece. In the case of an applicant holding more than one nationality (including Greek citizenship), he/she will be eligible if he/she has not resided in Greece during the previous 5 years;
3. not have resided or carried out his/her main activity in Greece for more than 12 months in the 3 years immediately prior to his/her appointment. Short stays such as holidays are not taken into account;

As an exception to the above nationality rule (2), Greek nationals are eligible if they can provide evidence that they have legally resided and have had their principal activity (work, studies, etc) in a non-associated third country for at least three out of the last four years immediately prior to the selection (for example, a Greek student having obtained BS and Msc degrees in the US is eligible). If in doubt about eligibility for this position, contact Prof. Bontozoglou, whose contact details are listed below.

Financial information / Salary

Annual gross salary and mobility allowance: around 37480 euro (estimated with average mobility allowance, which actually varies from 5406 euro to 8649 euro depending on family obligations).

Travel allowance: between 250 and 2,500 euro per year, depending on the researcher's country of origin

Career exploratory allowance: a single payment of 2,000 euro

Contacts

For more information about the post or your eligibility to apply for it, please contact:

Prof. Vasilis Bontozoglou: bont@mie.uth.gr

Application procedure

Applications for this position, including a Curriculum Vitae with the contact details of three referees, a cover letter, attestation of the diploma/master degree and final transcript of academic records, should be sent via email, using the reference MULTIFLOW in the subject line, to:

Prof Vasilis Bontozoglou: bont@mie.uth.gr

Department of Mechanical Engineering, University of Thessaly, Pedion Areos, Volos 38334, Greece

Deadline for applications: 15 April 2009