Post-Doc OPENING

Doctoral School Fundamental and Applied Sciences

Expected profile

- PhD degree in physico-chemistry of materials, rheology, fluids thermomechanics and computational fluid dynamics
- Excellent writing skills, fluent in English
- Rigorous, autonomous, creative and motivated by working within a multi-disciplinary team
- Skills in modeling of physical phenomena using experimental tests and numerical computations.
- Knowledge in polymeric materials, forming processes, programming in Python appreciated.

Working conditions

The PhD student will be supervised by:

- **Patrice Laure** (CNRS research director), specialist in computational fluid dynamics
- **Edith Peuvrel-Disdier** (CNRS research scientist), specialist in the flow of complex fluids
- **Séverine A.E. Boyer** (CNRS research scientist), specialist in solidification of multifaceted fluids

The proposed work will be conducted in the research group *Computing & Fluids* at the CEMEF, research center of MINES ParisTech, located in Sophia-Antipolis (France) in strong collaboration with the research center of Total in Feluy (Belgium). The selected candidate will be employed by Mines-ParisTech during twelve months. The contract should start 2020. Some stays will be organized at Feluy.

Contact and application procedure

For further information, please contact
P. Laure (patrice.laure@mines-paristech.fr)
E. Peuvrel-Disdier (edith.disdier@mines-paristech.fr)
Séverine A.E. Boyer (severine.boyer@mines-paristech.fr)
Yves Trolez (yves.trolez@total.com)

The application starts on January 1st, 2020

Modeling extruded polyolefin foaming

Total produces and sells various grades of polyolefins (polypropylene or polyethylene). The Polymer Research Center located in Feluy in Belgium (TRTF, Total Research & Technology Feluy) would like to deepen its knowledge of the mechanisms involved in the manufacture of polyolefin foams. The aim is to be able to define the characteristics of the raw materials that Total has to develop according to the final properties of the foams wanted by customers.

More precisely, the project concerns the physical foaming process by extrusion with gases such as carbon dioxide or isobutane. From this knowledge and modeling, we want to design a computational program available on standard Python or Matlab platforms. This program will define the foam structure according to the material characteristics and the manufacturing foaming conditions. It should allow to easily changing the characteristics of the material or the process conditions. The results obtained by this program will be compared with experimental results obtained in collaboration with Total teams.

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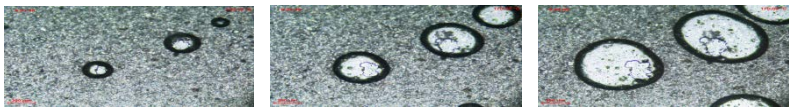

Example of bubble growth in a polyethylene matrix with an optical microscopy during chemical foaming (Betti L. 2019)

This project is strongly transdisciplinary (physics, data analysis, modelling, computing applied to engineering).

J.A. Reglero Ruiz, M. Vincent, J.F. Agassant, A. Claverie and S. Huck. Morphological analysis of microcellular PP produced in a core-back injection process using chemical blowing agents and gas counter pressure, *Polym. Eng. Sci.*, 55, 2465-2473 (2015)

J.A. Reglero Ruiz, M. Vincent and J.F. Agassant. Numerical Modeling of Bubble Growth in Microcellular Polypropylene Produced in a Core-Back Injection Process Using Chemical Blowing Agents, *Int. Polym. Proc.*, 31, 26-36 (2016)