Annex 1

Selection based on titles

Title of the research activity: “Study of CFD models for the management and design of glass melting furnaces”

Fields of the research activity:
Development of methodologies for the simulation of the glass flow inside a melting furnace of a plant for the production of pharmaceutical containers. The project shall start from the study of the most suitable physical model for this kind of phenomena and from its formalization in a mathematical problem. Since the objective of the simulations is the impact evaluation of the different furnace working parameters and furnace geometries on the quality of the end product, the research shall consider in particular the usage of a multiphase model suitable for simulating the presence of gas bubbles in the melted glass. The identification of a series of performance parameters which allow to relate the simulation results with the effective quality of the produced glass shall be an integral part of the modelling. The gas bubbles in fact, if not eliminated, lead to unwanted defects in the produced glass. The physical/mathematical model shall then be discretized and implemented in a suitable simulation software. The research shall take into account both Finite Volume (FV) discretization implemented in the open source library OpenFOAM and Finite Elements (FEM) discretization implemented in the open source libraries deal.II and FeniCS. The methodology shall be validated through a constant comparison with the temperature data collected in different areas of the furnace and with the data relevant to the quality of the end product.

Scientific Area of SISSA: Mathematics

Company: Bormioli Rocco S.p.A.

Places where the research activity shall be carried out: SISSA, via Bonomea 265, Trieste (TS) and Bormioli Rocco S.p.A., via Murano 2, San Vito Al Tagliamento (PN)

Smart specialisation strategy areas (S3) of Friuli Venezia Giulia and their development trajectories: Strategic production chains, Metalworking chain: technologies for the numerical modelling of processes and products and methods and intelligent machines

Area: 01 – Mathematics and information technology sciences
Competition sector: 01/A5 Numerical analysis and 08/B2 Mechanics of Solids and Structures (Scienza delle Costruzioni)
Relevant academic scientific sector: MAT/08 Numerical analysis and ICAR/08 Mechanics of Solids and Structures (Scienza delle Costruzioni)

Scientific responsible: Prof. Antonio De Simone

Duration of the fellowship: 24 months

Foreseen starting date of the activity: 01.02.2018

Gross annual fellowship: € 24.336

Requisites:

- Degree in Mathematics, Physics, Information technology, Mechanical, Aerospace, Aeronautical, Mathematical, Civil, Nuclear Engineering or similar subjects.
- Experience in research activities relevant to numerical and mathematical modelling for the mechanics of fluids, simulation of complex systems and scientific computing in Multiphysics, numerical fluid

dynamics, parametrization and optimization, computational complexity reduction methods, advanced computer programming, usage of open-source libraries;
- Two letters of reference.

A PhD in Applied Mathematics, Engineering or related areas will be considered as an asset.

Gross total cost of the research fellowship € 59.795,00: shall be funded by project HEaD – HIGHER EDUCATION AND DEVELOPMENT SISSA OPERATION 2 (FP1619889003), approved with decree of the autonomous region Friuli Venezia Giulia n. 2242 dated 11.04.2016 for the exclusive scope of the project funding the research fellowship.

Evaluation criteria:

PhD (evaluated as an asset): max 8 points

University degree: max 6 points

Published works and other research products: max 20 points

Other postgraduate degrees: max 6 points

Other titles: max 20 points