Open Early Stage Researcher/PhD Position at Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste -Italy, as part of

**European Innovative Training Network**

**Reduced Order Modelling, Simulation and Optimization of Coupled systems (ROMSOC)**

ROMSOC is a European Industrial Doctorate (EID) project in the programme Innovative Training Networks (ITN) and part of Marie Skłodowska Curie Actions within the Horizon 2020 programme. The ROMSOC EID Network brings together 15 international academic institutions and 11 industry partners and supports the recruitment of eleven Early Stage Researchers (ESRs). Each ESR will be working on an individual research project in the host institution with secondments related to their research in other academic and industrial partners of the network. The research is focused on three major topics: coupling methods, model reduction methods, and optimization methods, for industrial applications in well selected areas, such as optical and electronic systems, economic processes, and materials. The ROMSOC EID Network offers a unique research environment, where leading academics and innovative industries will integrate ESRs into their research teams for the training period, providing an excellent structured training programme in modelling, simulation and optimization of whole products and processes.

We seek excellent open-minded and team-spirited PhD candidates who will get unique international, interdisciplinary and inter-sectoral training in scientific and transferable skills by distinguished leaders from academia and industry. Within the ROMSOC network we offer the following PhD position at Scuola Internazionale Superiore di Studi Avanzati di Trieste (SISSA):

**Coupled parameterized reduced order modelling of thermo-hydro-mechanical phenomena arising in blast furnaces.**

Reference number: ROMSOC-ESR10 – Project (R_H2020_MC_ITN_MATE_Rozza_0409)

A blast furnace is a large furnace for smelting ores with the aim of producing industrial metals which can reach up to 1500°C. In the blast furnace process knowing the thermo-mechanical behaviour of the furnace crucible or the thermo-hydro-mechanical of the fluid-channel ensemble can enormously improve process efficiency. The parameterization of developed models with respect to the geometry design of several blast furnaces and their material types is essential in order to quickly transfer the results to the design of new blast furnaces. The project focuses on mathematical modeling of some thermo-hydro-mechanical phenomena arising in the blast furnace during the casting process. When fine associated nonlinear coupled models are available, reduced order models will be needed for their simulation in a short computation time. These models have to be constructed with efficient methods that preserve the coupling and the parameter structure.

The PhD candidate shall develop coupled multi-physics models arising of the casting processes of blast furnaces. The work comprises their parametrization with respect to geometrical design and the development order reduction methods to improve the computation time.

The PhD candidate will spend secondments for technical and scientific training at ArcelorMittal (Spain) and at the Consorcio Instituto Tecnolóxico de Matemática Industrial (ITMATI). The PhD degree will be awarded by Scuola Internazionale Superiore di Studi Avanzati di Trieste (SISSA)

**Requirements:**

- Master degree (or equivalent) in Mathematics, Mathematical Engineering, Industrial Mathematics, Scientific Computing, or other related disciplines.
- Experience in mathematical models in the field of solid mechanics and fluids.
- Experience in numerical solution of partial differential equations, and model order reduction.
- Experience in using software packages related with numerical simulation of multi-physics problems.
- Programming skills in object oriented languages as well as Python/Matlab.
- Strong interest in interdisciplinary scientific work.
- Ability to work independently and as part of a team.
- Strong motivation to pursue a PhD degree.
- Preferred qualifications include excellent grades, research talent (as proven by the master thesis), affinity with mathematical modeling and simulation in engineering applications, and personal ambition.
• Excellent command of English, together with good academic writing and presentation skills.

Starting Date: 1st of March 2018  
Contract: Full-time contract for 36 month  
Host institution: Scuola Internazionale Superiore di Studi Avanzati di Trieste (SISSA), Trieste, Italy  
Salary: The Marie Skłodowska-Curie programme offers highly competitive and attractive salaries. Gross and net amounts are subject to country specific deductions as well as individual factors and will be confirmed upon appointment.

Information/Contact: Prof. Dr. Gianluigi Rozza (Primary Supervisor) Email: gianluigi.rozza@sissa.it  
Application: Applications (motivation letter, detailed CV, certificates, list of MSc courses and grades, copy of the master thesis, reference letter etc) with indication of the position reference number should be send to protocollo@sissa.it  

Applicants that apply for more than one individual research project should indicate the order of preference (e.g. 1st, 2nd and 3rd choice).

DEADLINE 30.11.2017

To ensure the equality of opportunities we strongly encourage women with the appropriate qualifications to apply. If equally qualified, handicapped applicants will be preferred.

Eligibility: The candidate recruited in the ROMSOC project must be in the first four years from the date when the candidate obtained the degree entitling him or her to embark on a doctorate (e.g. master degree). No doctoral degree has been awarded during these four years. The candidate must not have resided or carried out her/his main activity (work, studies, etc.) in Italy for more than 12 months in the 3 years immediately prior to the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account. The candidate must work exclusively for the project during the employment contract. The candidate must fulfill the conditions to be admitted in the PhD programme indicated in the job vacancy. Tuition fees will be covered by the fellowship. These conditions must be fulfilled at the starting date of the contract. The starting date for each position is tentative.