

Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*)

1. Članica UL (*UL member*):

Univerza v Ljubljani, Fakulteta za strojništvo

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Katarina Mramor, katarina.mramor@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

2.13.01 - Procesno strojništvo (*Process engineering*)

4. Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo:

Usposabljanje mladega raziskovalca bo potekalo v Laboratoriju za dinamiko fluidov in termodinamiko na Fakulteti za strojništvo, ki ga sestavlja mednarodna interdisciplinarna ekipa inženirjev strojništva, fizikov in matematikov. Glavna usmeritev raziskovalne skupine je razvoj simulacijskih sistemov za večfazne, večnivojske in večfizikalne probleme z uporabo naprednih brez mrežnih numeričnih metod. Izhodišče raziskovalne naloge je nadaljnji razvoj modelov strjevanja, za vgradnjo v lastni simulacijski sistem, uporaben na najrazličnejših področjih tehnike, od farmacevtske (zmrzovanje bioloških sestavin) do metalurške industrije (najrazličnejši tipi ulivanja). Tovrstni modeli so bili dodobra razviti v preteklem desetletju in uspešno praktično uporabljeni v številnih slovenskih in tujih podjetjih.

Namen raziskovalne naloge je nadaljnji, poglobljeni razvoj vpliva elektromagnetnega polja na proces strjevanja. Elektromagnetno polje znatno vpliva na tok taline in posledično na makroizcejanje. Z njegovo inteligentno uporabo lahko bistveno izboljšamo končno kakovost strjenega materiala.

Cilj raziskovalne naloge je razvoj modelov strjevanja pod vplivom elektromagnetnega polja. Mladi raziskovalec bo sodeloval pri razvoju ustreznih fizikalnih in numeričnih modelov, izvajanju simulacij z različnimi pristopi modeliranja in optimizacije. Modeli bodo izdelani v treh dimenzijah na podlagi v raziskovalni skupini razvite brez mrežne tehnologije.

Od kandidata/kandidatke pričakujemo solidno poznavanje računalniške dinamike tekočin (CFD), programiranja in angleščine. Kandidat/ka bo imela pri raziskovalnem delu dostop do odlične raziskovalne opreme in vso podporo mentorja in sodelavcev.

eng:

The training of the young researcher will take place in the Laboratory for Fluid Dynamics and Thermodynamics at the Faculty of Mechanical Engineering, which consists of an international

interdisciplinary team of mechanical engineers, physicists, and mathematicians. The main focus of the research group is the development of simulation systems for multiphase, multilevel, and multiphysics problems using advanced meshless numerical methods. The starting point of the research is the further development of solidification models for implementation in our own simulation system, applicable in a wide variety of technical fields, from the pharmaceutical (freezing of biological components) to the metallurgical industry (various types of casting). These types of models have been well developed in the past decade and are successfully used in practice in many Slovenian and foreign companies.

The purpose of the research work is the further, in-depth development of the electromagnetic field in the solidification process. The electromagnetic field has a significant effect on the flow of melt and, consequently, on macrosegregation. With its intelligent use, we can significantly improve the final quality of the solidified material.

The goal of the research work is the development of models of solidification and macrosegregation under the influence of an external electromagnetic field. The young researcher will participate in developing models and methodology, performing simulations with different modelling approaches and optimisation. The models will be produced in three dimensions based on the meshless technology developed by the research group.

The candidate is expected to have a solid knowledge of Computational Fluid Dynamics (CFD), programming and English. During the research work, the candidate will have access to excellent research equipment and full support from the mentor and colleagues.