HRVATSKO **D**RUŠTVO ZA **M**EHANIKU
CROATIAN **S**OCIETY OF **M**ECHANICS
✉ **Ivana Lučića 5, HR -10000 ZAGREB**
Republika Hrvatska
☎ **01 61 68 540**
Faks: **01 61 68 187**
Žiro račun: 2360000-1101406777
e-mail: jasna.biondic@csm.hr
http://www.csm.hr

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"MESHLESS SOLUTION OF PHASE CHANGE PROBLEMS"

koje će održati ***prof. dr. Božidar Šarler****, Laboratory for Multiphase Processes, University of Nova Gorica, Slovenia*

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Prof. dr. sc. Jurica Sorić

Božidar Šarler
Laboratory for Multiphase Processes, University of Nova Gorica, Slovenia

MESHLESS SOLUTION OF PHASE CHANGE PROBLEMS

The structure of a new meshless solution procedure for calculation of one-domain coupled macroscopic heat, mass, momentum and species transfer problems as well as phase field concepted models of microstructure evolution is represented. The solution procedure is defined on a set of nodes which can be non-uniformly distributed. The domain and boundary of interest are divided into overlapping influence areas. On each of them, the fields are represented by the multiquadrics radial basis functions collocation on a related sub-set of nodes. The timestepping is performed in an explicit way. All governing equations are solved in their strong form, i.e no integrations are performed. The polygonisation is not present and the formulation of the method is practically independent of the problem dimension. The possible growth of the domain (like in the problems of die casting or continous casting) is described by activation of additional nodes and by the movement of the boundary nodes through the computational domain, respectively. The solution can be easily and efficiently adapted in node redistribution and/or refinement sense, which is of utmost importance when coping with fields exhibiting sharp gradients (phase field variable or enthaply, for example). Solution of convective-diffusive transport phenomena in continous casting and thin strip casting of aluminium alloys and steel is shown as well phase field model of microstructure evolution during heat treatment. The results with the new approach are compared with analytical solutions, well documented bench-mark solutions and commercial packages. The method turns out to be extremly simple to code, accurate, inclusion of the complicated physics can easily be looked over. The coding in 2D or 3D is almost identical.

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