

German-Russian Workshop

**Particle Methods:****Theoretical Foundations, Numerical Implementation, Coupling with Finite Elements**

Technical University Berlin

19-21 December 2005

**Organizers:** Prof. Dr. Valentin Popov, Prof. Dr. Sergey Psakhie, Prof. Dr.-Ing. G.-P. Ostermeyer**Objectives**

Numerical methods based on continuum models (FE) are very effective in simulating various mechanical systems. However, a number of physical processes can be simulated within the framework of continuum approaches only to a very limited extent. These are primarily the processes whereby the medium continuity is impaired, i.e. those of nucleation and accumulation of damages and cracks and failure of materials.

One of the reasons for widespread continuum methods is that differential equations of continuum mechanics allowed using effective analytical methods developed during the last two centuries. The recent advancement of computer engineering has made this advantage of continuum models less significant. Having no negation of the importance of analytical methods, we should nevertheless state that an ever-increasing number of problems in mechanics are solved by "direct" computations. To this end, the successfully continuized nature should be again discretized (e.g. in the finite element method). The reasons mentioned allow us to predict that in the immediate future there will be a rapid development of simulation methods based directly on the discrete representation of materials with no continuization of the latter as an intermediate step. We refer to these "directly discrete" methods as to *particle methods*.

The first applications of the particle methods showed some specific problems. One of the most encountered problem is the "packing" dependence of the particle system properties which is absent in the initial medium prior to discretization. These problems have been successfully solved recently.

The main real "problem" of particle methods now is not the physical but just an "organizational" one: the software based on continuum approaches is so wide spread, that it is very difficult - both from organizational and financial point of view - to go over to another approaches.

The main purpose of the Workshop is to discuss the possibilities of integrating the particle methods into the existing FE programs as modules which are more effective in special applications. In this way the advantages of continuum and discrete approaches can be combined.

**Topics**

Molecular dynamics, movable cellular automata (MCA), method of mesoparticles: theoretical foundations and numerical implementation. Coupling of particle methods with Finite Elements.

**Deadline for submission of Abstracts**

If you are interested in the participation, please submit an abstract in English not later than Oktober 15, 2005 (preferably by e-mail).

**Contact:**

Prof. Dr. Valentin Popov  
TU Berlin  
Institute of Mechanics  
Skr. C8-4  
Str. des 17. Juni 135  
D-10623 Berlin  
GERMANY

Tel: +49 (30) 314 21 480  
Fax.: +49 (30) 314 72 575  
E-mail: v.popov@tu-berlin.de  
www.reibungsphysik.de