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## Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Montag, **16.03.2009, 14:30 Uhr**, Egerlandstr. 5, Raum 0.044

# Energy-momentum schemes for large deformation contact problems

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From the beginning of the early 90s of the past century, variationally consistent constraints for domain decomposition problems have been developed. The so-called mortar method arises from these developments. Within the following years the mortar method has been extended to large deformation contact problems.

During the same time period, energy-momentum schemes have been successfully developed for nonlinear elastodynamics and extended to constrained mechanical systems. In our actual developments, we have extended the energy-momentum approach to the well known and widely used 'Node-to-Segment' (NTS) contact method and to the before mentioned mortar contact method for two-dimensional problems. This approach guarantees stability of the time integration scheme for arbitrarily large time steps. On the other hand small time steps are often necessary especially in contact situations. Due to the use of Lagrange multipliers, the condition number of the system matrix deteriorates with  $O(\Delta t^3)$ . A discrete null-space matrix determined either analytically or numerically can be used to eliminate the Lagrange multipliers leading to a minimum set of unknowns.

Using special augmentation techniques we were able to construct an energy-momentum scheme for three-dimensional domain decomposition problems and are currently working on the corresponding extension to three-dimensional, large deformation contact problems.