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Lecture No. 72

Czech Society for Mechanics
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Twin mortar method: A new unbiased mesh tying formulation

given by

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This work was motivated by the author's six-month stay in the Aerospace Mechanics Research Center of the University of Colorado Boulder. The author joined the Multi-Physics Design Optimization group focusing on the level-set eXtended Finite Element Method (XFEM) topology optimization. The main aim was to revise existing interface formulations and come up with a new one that would be robust and stable enough to be used with the level-set XFEM. The mesh tying is an important issue encountered in the finite element analysis of complex structures. It enables to join the adjacent dissimilarly meshed parts or their regions. This problem is even more pronounced in the case of isogeometric analysis that is a modern spatial discretization technique which instead of Lagrange shape functions utilizes NURBS basis functions. Conventional mesh tying methods are based on the master-slave concept that leads to a biased algorithm. Consequently, results are influenced by the selection of the master and the slave interface. Inspired by the two-pass dual formulations, we come up with a new formulation which inherits all appealing properties of the mortar method. Namely, it preserves optimal convergence rates and is variationally consistent. At the same time, the newly proposed mesh tying formulation is unbiased, i.e. the formulation is independent on the selection of the master and slave side. As a result, it substantially simplifies the definition of mesh tying interface and has a great potential for the solution of the self-contact problems.

The lecture will be held on Monday, September 23, 2019 at 14:00 in the building of the Institute of Thermomechanics (lecture room B), Dolejškova 5, 182 00 Prague 8

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