ECCM 2010
IV European Conference on Computational Mechanics
Palais des Congrès, Paris, France, May 16-21, 2010

On a new 3D contact domain method for large deformation contact problems

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This work describes a three-dimensional contact domain method for large deformation contact problems. In contrast to many other contact formulations in this method, the necessary contact constraints are formulated on a so-called contact domain, which can be interpreted as a fictive intermediate region connecting the potential contact surfaces of the deformable bodies (see Figure 1). This contact domain, which has the same dimension than the contacting bodies, is endowed with a displacement field, interpolated from the displacements at the contact surfaces. In addition, it is subdivided into a non-overlapping set of contact patches, where the contact constraints will be applied. For the enforcement of these contact constraints a stabilized Lagrange multiplier method is used, in terms of patch-wise constant Lagrange multipliers, which allows the condensation of the introduced Lagrange multipliers, leading to a purely displacement driven problem. Theoretical basis and numerical aspects of this specific contact method are given in [1] and [2] for two-dimensional, large deformation frictional contact problems.

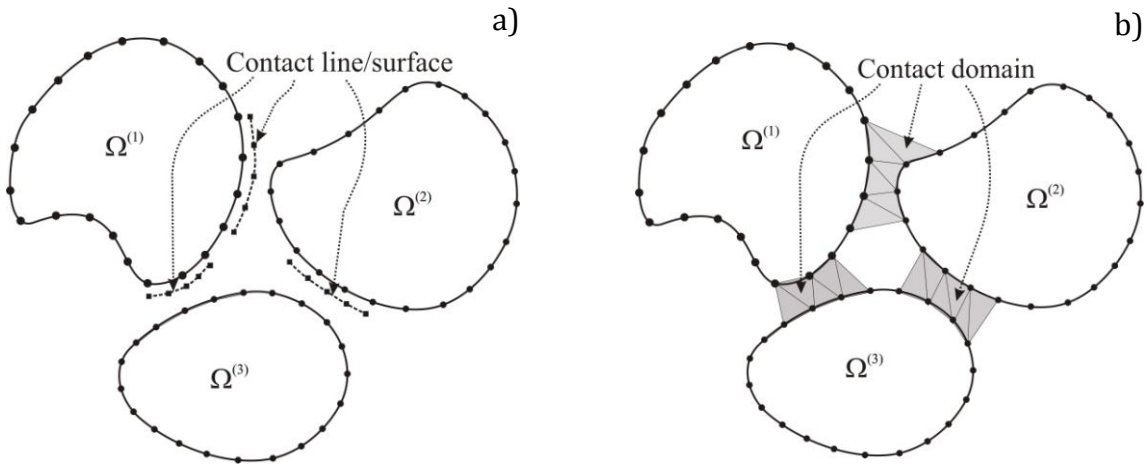

Figure 1: Imposition of contact constraints on the contacting bodies:
a) classical methods b) contact domain method

References

[1] J. Oliver, S. Hartmann, J. C. Cante, R. Weyler,J. Hernández. A contact domain method for large deformation frictional contact problems. Part 1: Theoretical basis. *Computer Methods in Applied Mechanics and Engineering*. **198**, 2591-2606, 2009.

[2] S. Hartmann, J. Oliver, R. Weyler, J. C. Cante,J. Hernández. A contact domain method for large deformation frictional contact problems. Part 2: Numerical aspects. *Computer Methods in Applied Mechanics and Engineering*. **198**, 2607-2631, 2009.