A finite element contact analysis algorithm using distance functions

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Abstract

The non-penetration constraint needs to be satisfied in solving contact problems. In the conventional approaches of finite element contact analysis, the penetrations have been evaluated via closest point projection of the node on one surface onto the other surface. In this work, the distance functions used in level set method are introduced to formulate the non-penetration condition. The geometric and mechanical constraints are imposed in weak form consistent with finite element formulation. Furthermore, the approach is applied to the contact analysis of voxel finite element models for the applications in the biomechanics field. This work was supported by JSPS KAKENHI Grant Numbers JP15K04757.

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