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A REACTION FORCE COMPUTATION SCHEME FOR CONTACT ANALYSIS WITH QUADRATIC TETRAHEDRAL ELEMENTS

Tomonori Yamada [1] and Shinobu Yoshimura [2]

[1] Research into Artifacts, Center for Engineering, The University of Tokyo
Kashiwanoha 5-1-5, Kashiwa, Chiba 277-8568, Japan, yamada@race.u-tokyo.ac.jp
http://www.race.u-tokyo.ac.jp
[2] Department of Systems Innovation, School of Engineering, The University of Tokyo
7-3-1 Hongo, Bunkyo, Tokyo 113-8656, Japan, yoshi@sys.t.u-tokyo.ac.jp
http://save.sys.t.u-tokyo.ac.jp/

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With the growth of computing technology, large scale structural finite element analyses with more than tens of millions degrees of freedom are spreading rapidly in both academic and industrial community[1]. Nowadays, not only a single component analyses but also analyses of assembled structures are required.

The recent large scale finite element analyses of geometrically complicated structures are also depending much on the automatic mesh generation technology, where the tetrahedral meshing is the almost unique approach. Because of the accuracy problem, quadratic elements are generally adopted in case of finite element analyses with tetrahedral elements.

However, the current contact analyses with quadratic tetrahedral elements have defect in the reaction force computation. Here, the reaction force on the corner node can not express the contact status correctly. So far, the commercial finite element codes generally subdivide the quadratic tetrahedral element on the contact interface into many hexahedral elements to avoid this defect[2].

In this paper, a new reaction force computation scheme for contact analysis with quadratic tetrahedral elements is proposed. In our approach, a simple post-analysis computation of reaction force on the corner nodes can correctly indicate the contact status. Some numerical examples are illustrated to demonstrate the performance of our reaction force computation scheme.

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