

Large-scale Simulations of Viscoelastic Deformable Multi-body Systems Using Quadruple Discrete Element Method on Supercomputers

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ABSTRACT

In this paper, an effective method of large-scale viscoelastic deformation analysis in multi-body systems using quadruple discrete element method (QDEM) [1] is proposed. The QDEM, which does not require calculation of global matrices can be a powerful alternative of finite element method (FEM) on the memory-distributed systems such as supercomputers. By applying space-filling curves to decomposition of the computational domain, we are able to contain the same number of particles in each decomposed domain. In our implementation, several techniques for particle counting and data movement have been introduced. The good performance scalability was successfully achieved on the TSUBAME2.5 supercomputer at Tokyo Institute of Technology.

REFERENCES

- [1] Sakaguchi, "New Computational Scheme of Discrete Element Approach for the Solid Earth Multi-Materials Simulation using Three-Dimensional Four Particle Interaction", FRONTIER RESEARCH EARTH EVOLUTION, VOL. 2.