A New Parallel Numerical Model for Multiple Collisions

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ABSTRACT

The A-CD^2 method [1] is used for numerical simulation in collisions of rigid bodies. This method solves a large scale constrained minimization problem in order to obtain the new velocities of each particle after a collision. The minimization problem is originally solved using the Uzawa method [2]. Unfortunately, the Uzawa method converges very slowly. In order to overcome this shortcoming, we propose a new numerical model that improves the previous approach in three ways: (i) the minimization problem is solved with a interior point method [3, 4] implemented in the CPLEX library [5], which converges in half of time required by the Uzawa method; (ii) the new model includes the rotational dynamics of the free moving rigid bodies between collisions; (iii) a parallel implementation of the updated velocities after collision is included. This new approach allow us to obtain numerical simulations with a large number of solids that was not possible before.

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