GPU-BASED DISCRETE ELEMENT RIGID BODY TRANSPORT

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Abstract

The protection of harbours and coastal infrastructure is of vital importance to South Africa. A major development in the design of packing strategies for breakwaters is numerical modelling, and the use of physics engines and DEM models. For applications in coastal engineering and also in pavement engineering, the capture of particle shapes as polyhedra rather than clumped spheres is particularly important. The development of a Discrete Element Model applicable to both fields, and to industrial granular flows, is described. The code under development, BLAZE-DEM, is designed for Graphics Processor Units to take advantage of the speed and low cost driven by the virtual environment and animation industry. It uses a spatial hash and GPU parallelism for collision detection, and a hybrid penalty-based and impulse methods for particle collisions. The code is currently capable of simulating a million particles in near real time on GPU processors. Comparisons of test cases with experimental and computational results from Coetzee and Els [1] for corn seed hoppers are shown.