

Contributed Talk

Splinter Computation

A SMOOTH PARTICLE HYDRODYNAMICS CODE TO MODEL
COLLISIONS BETWEEN SOLID, SELF-GRAVITATING OBJECTS

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We will present the latest improvements and applications of the Tübingen-Vienna Smooth Particle Hydrodynamics (SPH) code. Modern graphics processing units (GPUs) lead to a major increase in the performance of the computation of astrophysical simulations. Owing to the different nature of GPU architecture compared to traditional central processing units (CPUs) such as x86 architecture, existing numerical codes cannot be easily migrated to run on GPU. Here, we present the implementation of the numerical method SPH using CUDATM. We have implemented the SPH equations to model fluids and elasto-plastic solid bodies and added a fragmentation model for brittle materials. Our material models allow for treatment of granular media and porosity. Self-gravity may be optionally included in the simulations and is treated by the use of a Barnes-Hut tree. We will present some recent applications of the code: collisions between Ceres-sized objects, modelling of sampling processes on Phobos' surface and impacts into asteroids related to the AIDA mission. The code is freely available upon request.