



Diplomanden- und Doktorandenseminar  
des Instituts für Informatik

## A Unified Approach for Physically-Based Simulations and Haptic Rendering

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Based on our new geometric data structure, the inner sphere trees, we present fast and stable algorithms for different kinds of collision detection queries between rigid objects at haptic rates. Namely, proximity queries and the penetration volume, which is related to the water displacement of the overlapping region and thus corresponds to a physically motivated force.

The latter allows us to define a novel penalty-based collision response scheme that provides continuous forces and torques which are applicable to physically-based simulations as well as to haptic rendering scenarios. Moreover, we present a time-critical version of the penetration volume computation that is able to achieve very tight bounds within a fixed budget of query time.

The main idea of our new data structure is to bound the object from the inside with a set of non-overlapping bounding volumes.

The results show performance at haptic rates both for proximity and penetration volume queries, independent from the polygon count of the objects.

Donnerstag, den 30.07.2009

11:30 Uhr in Raum 106, IfI, Julius-Albert-Straße 4