

Abstract

Real-time point-based rendering and interaction with virtual objects is gaining popularity and importance as different haptic devices and technologies increasingly provide the basis for realistic interaction. Haptic Interaction is being used for a wide range of applications such as medical training, remote robot operators, tactile displays and video games. Virtual object visualization and interaction using haptic devices is the main focus; this process involves several steps such as: Data Acquisition, Graphic Rendering, Haptic Interaction and Data Modification. This work presents a framework for Haptic Interaction using the GPU as a hardware accelerator, and includes an approach for enabling the modification of data during interaction. The results demonstrate the limits and capabilities of these techniques in the context of volume rendering for haptic applications. Also, the use of dynamic parallelism as a technique to scale the number of threads needed from the accelerator according to the interaction requirements is studied allowing the editing of data sets of up to one million points at interactive haptic frame rates.