

Rounded cell collision detection dynamics.

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Abstract—

Index Terms—particle system, image space, collision detection, nearest neighbor, region of interest, GPU, GPGPU.

I. INTRODUCTION

The paper is an extension to a paper entitled *Rounded cell collision detection on the GPU* [] where Rounded Cell Collision Detection was performed on a set of static particles in various states of collision. In this paper we discuss RCCD while particles are in motion. This will involve exploring Regions of Interest (RI) more fully as they can be configured to provide any number of properties required to fulfill specific application requirements. Some applications may require hard or soft shell collisions, inelastic or elastic responses, and/or repulsion/attraction dynamics. Many applications will require the compute stage to execute on data a number of times so to balance energy before rendering and building a new potentially colliding set (PCS).

Some of this study is based on what will be defined as an *autonomous particle* - that is a locally discrete kinetic particle as opposed to a nodal type particle as is the case of SPH and DEM for example. Also explored is a method of retrieving data for analysis called HSV color mapping. HSV color mapping provides two fold advantage over traditional methods. First, it does not require a transfer of data from the GPU to the CPU as the data is in the form of captured images from the CPU frame buffer. Analysis can then be performed by processing images. Second, the color map can be used to produce angle, velocity, and temperature flow fields - among others.

REFERENCES