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Comp 477 N

Elastic Deformation of Rods in the Context of Sports

Motivation

I came up with the idea of simulating a net in the context of sports, because I wanted to conceive something original and that would relate to my other interests. I am a hockey player, and I would be proud to complete a project that combines both my main interests: sports and computer sciences. The domains of computer games and animation are the ones that intrigue me the most and I think this project is the perfect way to showcase my passions and abilities.

Description

The project would consist of simulating nets used in sports. A starting point would be to simulate a ball that falls in a tight net that is similar to a butterfly net in terms of size. A more advanced example would be a soccer ball that reaches a goal and hits its netting. A way to properly simulate those examples would be to use multiple elastic rods linked together to form a net. The model of the individual rod will be based on the discrete elastic rods of Bergou et al. (1). In order to solve and simulate a full system of these elastic rods, equations used in class for cloth animation and for time integration will be needed.

Objectives

1. Recreate, render and apply the physics of the model of a single rod
2. Geometric and physical model of a net of elastic rods
3. Collision model of a net of elastic rods with external spherical object
4. Render different scenarios to showcase the versatility of the net model in different configurations, such as a basketball net.

(1)"Discrete Elastic Rods"
Miklós Bergou, Max Wardetzky, Stephen Robinson, Basile Audoly, Eitan Grinspun
ACM Transactions on Graphics (SIGGRAPH) 2008