1 Introduction

This report documents is about a simulation of a pieces of cloth interacting with rigid bodies. With rigid bodies and cloth, the rigid bodies affect the cloth but not vice versa. In our simulation, the cloth must interact with its environment i.e. self-collision, cloth-character collision and cloth-objects collision must be regarded. Also, force will be considered, at least gravity. We use mass spring systems for simulating cloth to get it to look right physical properties of cloth which can folds, wrinkles and stretches to conform to its colliders. The appearance of the cloth comes primarily from response to these conditions, and we use computer graphics to render them. The simulation shows the cloth falling down and covering an object of sphere shape.

2 Mass Spring System implementation on cloth

The cloth model is represented by a grid of triangles with a given mass to each point and those triangles are connected by a series of springs.

There are three types of spring which needed to get the characteristics of cloth:

- Structural springs: Handle extension and compression and are connected vertically and horizontally.

- Shear springs: Handle shear stresses and are connected diagonally.

- Bend springs: Handle bending stresses and are connected vertically and horizontally to every other point.

In our cloth simulation, only Structural springs and Bend springs are used. We use Structural springs for all triangles and Bend springs for all the springs connected the neighboring triangles. As the two neighboring triangles can always maintain a rectangle shapes, there is no need to use the Shear springs on it. When the simulation is initiated, each springs rest length is set to the original length of the springs. The mass values and the springs stiffness are also set. Once the mass springs are all set up, and an environmental force, for example gravity, is applied to the points in the model over a specified time step, it produces a resulting acceleration for each point. This acceleration gives rise to a velocity which causes the point to update its position. The new position of each point in turn causes a change in length to each connected spring. The combination of the point and spring forces is integrated with respect to time to provide a new acceleration for each point. The iterative process of calculating forces and updating positions provides the motion of the cloth object.