Fast simulation of hair and fur

Overview
While it is common in films to simulate single hair strands on virtual humans and on furry animals, those features are either not present on characters in computer games or modeled with simplified textured meshes. The main difficulty of simulating hair in real time applications is the sheer number of hair strands and the fact that each hair is inextensible. Keeping thousands of deformable objects from being stretched is computationally expensive.

Muller et al. [1] present a robust method for simulating hair and fur that guarantees inextensiblity with a single iteration per frame. For an iteration count this low, previous methods either become unstable or introduce a substantial amount of stretching.

Figure 1: Various hair types simulated in real time by the method in [1].

Project
Implement a hair simulator based on the method from [1]. Your engine should allow for simulating various hair types, and it should perform in real time for large amounts of hairs. Use parallelism to cut down on execution time. Realistic hair rendering should also be considered.

References
[1] Fast Simulation of Inextensible Hair and Fur. Matthias Müller, Tae-Yong Kim, and Nuttapong Chentanez. *VRIPHYS, page 39-44. Eurographics Association*, (*2012*).