

## 24. DIPIN M

### Enriching Triangle Mesh Animations with Physically Based Simulation

This is a system to combine arbitrary triangle mesh animations with physically based Finite Element Method (FEM) simulation, enabling control over the combination both in space and time. The input is a triangle mesh animation obtained using any method, such as keyframed animation, character rigging, 3D scanning, or geometric shape modeling. The input may be nonphysical, crude or even incomplete. The user provides weights, specified using a minimal user interface, for how much physically based simulation should be allowed to modify the animation in any region of the model, and in time. Our system then computes a physically-based animation that is constrained to the input animation to the amount prescribed by these weights. This permits smoothly turning physics on and off over space and time, making it possible for the output to strictly follow the input, to evolve purely based on physically based simulation, and anything in between. Achieving such results requires a careful combination of several system components. We propose and analyze these components, including proper automatic creation of simulation meshes (even for non-manifold and self-colliding undeformed triangle meshes), converting triangle mesh animations into animations of the simulation mesh, and resolving collisions and self-collisions while following the input.