Interactive Shape Modeling using a Skeleton-Mesh Co-Representation

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We introduce the Polar-Annular Mesh representation (PAM). A PAM is a mesh-skeleton co-representation designed for the modeling of 3D organic, articulated shapes. A PAM represents a manifold mesh as a partition of polar (triangle fans) and annular (rings of quads) regions. The skeletal topology of a shape is uniquely embedded in the mesh connectivity of a PAM, enabling both surface and skeletal modeling operations, interchangeably and directly on the mesh itself. We develop an algorithm to convert arbitrary triangle meshes into PAMs as well as techniques to simplify PAMs and a method to convert a PAM to a quad-only mesh. We further present a PAM-based multi-touch sculpting application in order to demonstrate its utility as a shape representation for the interactive modeling of organic, articulated figures as well as for editing and posing of pre-existing models.

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