1142-53-146 **Etienne Vouga*** (evouga@cs.utexas.edu), University of Texas, Austin, TX. *Computational Triaxial Weaving of Curved Surfaces*

Although weaving as a technique for fabricating baskets and other containers is a timeless art, there are geometric and topological obstructions to weaving general 3D shapes out of thin elastic ribbons such as reed or bamboo. The problem of designing a triaxial weave approximating a target surface, that holds its shape in static equilibrium when fabricated, can be couched in terms of optimizing a vector field on a six-fold branched cover of that surface, with the integral curves of the vector field describing the layout of ribbons on the surface. We discuss the relationship between the physics and geometry and topology of woven structures, describe the optimization of fabricable weave patterns in terms of techniques from discrete differential geometry on vector field design and surface parameterization, and present an algorithmic pipeline for computational design of triaxial weaves on arbitrary curved surfaces using thin ribbons. (Received September 01, 2018)