1070-51-126 **Andrew O. Furnas*** (andrew_furnas@brown.edu), 69 Brown St. Box 4638, Providence, RI 02912. *Understanding the Drape of Woven Fabrics.*

The goal of this research is to use techniques from continuous and discrete differential geometry to better understand the drape of woven fabric. For example, why does twill-woven cotton (denim jeans) drape differently than plainly woven cotton (most dress shirts). Why do shoulder seams have to exist in woven shirts, but one can knit a sweater with no seams at all? Most models for the draping of flexible materials make the simplifying assumption that the material is isotropic; real fabric is highly anisotropic. These investigations date back to Pafnuty Chebyshev, who in 1878 he defined what are now known as Chebyshev nets. These are parametrizations of surfaces in 3-space which have unit length partial derivatives in each of the coordinate directions. This corresponds to a piece of plainly woven fabric where the fibers themselves are inextensible. We are now taking a discrete approach by building a fiber-based model where a discrete differential geometric model for an elastic rod is woven to form a piece of fabric, and then draped. This is inspired by Simulating Knitted Cloth at the Yarn Level by Kaldor, James and Marschner (2008). The fiber model itself builds from the work of Max Wardetzky and his collaborators on Discrete Elastic Rods (2008). (Received February 05, 2011)