1161-68-305   **Josh Vekther**, **Jiacheng Zhuo**, **Luisa Gil Fandino**, **Qixing Huang** and **Etienne Vouga***
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We then connect the physics governing surfaces woven out of thin ribbons to the geometry of geodesic foliations—foliations whose leaves are all approximately geodesic curves—and develop several new variational algorithms for computing such foliations. Our key insight is a relaxation of vector field integrability in the discrete setting, which allows us to optimize for curl-free unit vector fields that remain well-defined near singularities and robustly recover a scalar function whose gradient is well aligned to these fields. We present a design and fabrication pipeline for approximating surfaces of arbitrary geometry and topology by triaxially-woven structures, where the ribbon layout is determined by a geodesic foliation on a sixfold branched cover of the input surface. We validate the effectiveness of our pipeline on a variety of simulated and fabricated woven designs. (Received August 19, 2020)