PHYSICAL MATHEMATICS SEMINAR

Geometry-driven filamentary structures: triaxial weaves and clasps

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ABSTRACT:

In this talk, I will cover two distinct topics in the realm of the mechanics of slender structures with strong geometric constraints. These studies involve a combination of geometric reasoning, numerical simulations, and precision model experiments using scale-invariance and advanced imaging techniques. First, I will present the mechanics of two elastic rods in a crossing contact, whose geometric counterpart is often referred to as a 'clasp'. We compare our experimental and computational results to a well-established description for ideal clasps of geometrically rigid strings, finding that the latter acts as anunderlying 'backbone' for the full elasticity solution. Second, I will present triaxial weaving, a traditional craft technique for creating curved structures using initially straight and flat ribbons. Unlike the traditional weaving, in which surface curvature is introduced only by means of topological defects, we achieve smooth weaved structures by tuning the in-plane curvature of the ribbons. The potential of this new design scheme is demonstrated with a few canonical target shapes.

TUESDAY, DECEMBER 7, 2021
2:30 PM – 3:30 PM
Building 2, Room 449

https://math.mit.edu/sites/pms/

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- **remember to keep your mask on while inside buildings**
- **eating food is not allowed within lecture rooms**

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