

The non-linear mechanics of slender deformable bodies

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We discuss some challenges arising in the mechanics of slender (quasi-1D) deformable bodies, such as a thin thread of a viscous fluid [1,2], curly hair [3,4,5], or a carpenter's tape for example. Slender bodies can exhibit a number of complex and intriguing behaviors that are accessible through simple experiments. The analysis of slender bodies exposes one to many of the fundamental concepts of 3D non-linear mechanics, albeit in a simpler setting where explicit analytical solutions and fast numerical methods can be proposed. Based on examples, we review some problems arising in the analysis of deformable bodies, including the derivation of accurate 1D mechanical models by dimensional reduction, the solution of non-linear 1D models by analytical or numerical methods, and the analysis of material or geometrical instabilities.



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