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pierre seppecher* (seppecher@univ-tln.fr), Institut de Mathématiques, Université du Sud-Toulon-Var, 83957 La Garde, France. *Comparison of the asymptotic analyses of a non-planar rod in linear elasticity and non-linear elasticity.*

We study the asymptotic behavior of an elastic material lying in a thin neighborhood of a non-planar line when the diameter of the section tends to zero. The possibility of a varying section is considered. This particular geometry makes difficult to get a-priori estimates. When considering a linear elastic material, one has to determine the asymptotic behavior of the Korn constant of the domain. When considering a non-linear material, one has to determine the asymptotic behavior of the Rigidity constant (in the sense of Friesecke, James, Muller (2002)). Both problems are similar and so are the methods to solve them.

We prove the convergence (in the framework of Γ -convergence) of the three-dimensional models to the one-dimensional models classically used in mechanics for describing non-extensional lines subjected to flexion and torsion.

In non-linear elasticity the resulting model, which is still non linear, takes into account only the linear approximation of the starting model. This should not be surprising : it is characteristic of thin structures to have large displacements while the strain tensor remains small. (Received August 14, 2006)