

Sanchez-Hubert, Jacqueline; Sanchez Palencia, Evariste**Statics of curved rods on account of torsion and flexion.** (English) Zbl 0938.74040

Eur. J. Mech., A, Solids 18, No. 3, 365-390 (1999).

Summary: We address the problem of a thin curved rod in linear elasticity for small displacements. We use an asymptotic two-scale method based on the small parameter ε , ratio of the thickness to the overall lengths. The two leading-order terms have the Bernoulli's structure, and the corresponding displacement is inextensional. The constitutive law involves torsion effects of the same order as flexion effects, so that the description of the kinematics involves an angle θ which is the rotation of the sections. The Lagrange multiplier, associated with the constraint of inextensibility, is discussed. We give a variational formulation of the problem in the subspace of the inextensional displacements, and discuss the equations involving the Lagrange multiplier.

MSC:**74K10** Rods (beams, columns, shafts, arches, rings, etc.)**74B05** Classical linear elasticity**74H10** Analytic approximation of solutions (perturbation methods, asymptotic methods, series, etc.) of dynamical problems in solid mechanicsCited in 18 Documents**Keywords:**

subspace of inextensional displacements; thin curved rod; linear elasticity; asymptotic two-scale method; small parameter; torsion effects; flexion effects; Lagrange multiplier; variational formulation

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