Numerically tackling the solution of the (quasi-)inextensible "pantographic beam" model by means of variational techniques

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The pantographic beam model for slender structures resembling pantographs with quasi-inextensible and inextensible fibers will be recalled. Boundary conditions for the variational problem arising from the model will be briefly discussed and then compared to those one needed in the geometrically non-linear Euler model. Successively, the numerical solution of some benchmark problems will be addressed by means of finite elements minimization techniques and Hellinger-Reissner variational principle both for the pantographic beam model and the geometrically non-linear Euler model. Convergence of the quasi-inextensible pantographic beam model to the inextensible one, as the extensional stiffness goes to infinity, will be studied. Finally, some equilibrium shapes obtained with the use of the pantographic beam model and exhibiting highly non standard features will be shown.