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Straightening wrinkles. (English) Zbl 1323.74013
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Summary: We consider the elastic deformation of a circular cylindrical sector composed of an incompressible isotropic soft solid when it is straightened into a rectangular block. In this process, the circumferential line elements on the original inner face of the sector are stretched while those on the original outer face are contracted. We investigate the geometrical and physical conditions under which the latter line elements can be contracted to the point where a localized incremental instability develops. We provide a robust algorithm to solve the corresponding two-point boundary value problem, which is stiff numerically. We illustrate the results with full incremental displacement fields in the case of Mooney-Rivlin materials and also perform an asymptotic analysis for thin sectors.

MSC:

74B10 Linear elasticity with initial stresses

Cited in 3 Documents

Keywords:

soft solids; straightening; instability; asymptotic analysis; impedance matrix method

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