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A reformulation of the strong ellipticity conditions for unconstrained hyperelastic media.
(English) [Zbl 0876.73030](#)
J. Elasticity 44, No. 1, 89-96 (1996).

Summary: The conditions for the strong ellipticity of the equilibrium equations of compressible, isotropic, nonlinearly elastic solids are expressed in terms of the stored-energy function regarded as a function of the principal stretches. The applicability of this reformulation is illustrated with two specific examples.

MSC:

[74B20](#) Nonlinear elasticity

Cited in **31** Documents

Keywords:

[function of principal stretches](#); [equilibrium equations](#); [stored-energy function](#)

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References:

- [1] H.C. Simpson and S.J. Spector, On copositive matrices and strong ellipticity for isotropic elastic materials. *Arch. Rational Mech. Anal.* 84 (1983) 55-68. · [Zbl 0526.73026](#) · [doi:10.1007/BF00251549](#)
- [2] P. Rosakis, Ellipticity and deformations with discontinuous gradients in finite elastostatics. *Arch. Rational Mech. Anal.* 109 (1990) 1-37. · [Zbl 0731.73023](#) · [doi:10.1007/BF00377977](#)
- [3] L.M. Zubov and A.N. Rudev, An effective method of verifying Hadamard's condition for a non-linearly elastic compressible medium. *J. Appl. Math. Mech.* 52 (1992) 252-260. · [Zbl 0785.73022](#) · [doi:10.1016/0021-8928\(92\)90080-R](#)
- [4] J.K. Knowles and E. Sternberg, On the failure of ellipticity of the equations for finite elastostatic plane strain. *Arch. Rational Mech. Anal.* 63 (1977) 321-336. · [Zbl 0351.73061](#) · [doi:10.1007/BF00279991](#)
- [5] R. Hill, On the theory of plane strain in finitely deformed compressible materials. *Math. Proc. Camb. Phil. Soc.* 86 (1979) 161-178. · [Zbl 0435.73042](#) · [doi:10.1017/S0305004100000724](#)
- [6] G. Aubert and R. Tahraoui, Sur la faible fermeture de certains ensembles de contraintes en elasticite non-lineaire plane. *Arch. Rational Mech. Anal.* 97 (1987) 33-59. · [Zbl 0619.73014](#) · [doi:10.1007/BF00279845](#)
- [7] P.J. Davies, A simple derivation of necessary and sufficient conditions for the strong ellipticity of isotropic hyperelastic materials in plane strain. *J. Elasticity* 26 (1991) 291-296. · [Zbl 0759.73013](#) · [doi:10.1007/BF00041893](#)
- [8] F. John, Plane elastic waves of finite amplitude; Hadamard materials and harmonic materials. *Commun. Pure Appl. Math.* 19 (1966) 309-341. · [Zbl 0139.43401](#) · [doi:10.1002/cpa.3160190306](#)
- [9] S.A. Silling, Creasing singularities in compressible elastic materials. *J. Appl. Mech. Trans. ASME* 58 (1991) 70-74. · [doi:10.1115/1.2897181](#)
- [10] Y. Wang and M. Aron, Radial deformations of cylindrical and spherical shells composed of a generalized Blatz-Ko material. *J. Appl. Math. Mech. (ZAMM)* (in press). · [Zbl 0925.73564](#)
- [11] C. Truesdell and W. Noll, *The Non-linear Field Theories of Mechanics*, Handbuch der Physik, Volume III/3. Springer-Verlag, Berlin, Heidelberg, New York (1965). · [Zbl 0779.73004](#)
- [12] R. Abeyaratne and C.O. Horgan, The pressurised hollow sphere problem in finite elastostatics for a class of compressible materials. *Int. J. Solids Structures* 20 (1984) 715-723. · [Zbl 0546.73033](#) · [doi:10.1016/0020-7683\(84\)90060-X](#)
- [13] J.K. Knowles and E. Sternberg, On the ellipticity of the equations of nonlinear elastostatics for a special material. *J. Elasticity* 5 (1975) 341-361. · [Zbl 0323.73010](#) · [doi:10.1007/BF00126996](#)
- [14] M. Aron and S. Aizicovici, Two new universal relations in nonlinear elasticity and some related matters. *J. Appl. Mech. Trans. ASME* 61 (1994) 784-787. · [Zbl 0827.73008](#) · [doi:10.1115/1.2901555](#)

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