ASYMMETRIC CONTINUUM MECHANICS: DEVIATIONS FROM ELASTICITY AND SYMMETRY

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A b s t r a c t

The Kröner approach to continua with a distribution of self-field sources is applied to a wide class of deviations from the classical ideal elasticity; the same approach is applied to the theory of continua with asymmetric fields. The corresponding equations of motion are derived. Such an approach replaces other methods based on the constitutive relations specific for each type of the medium; here, the reference constitutive relation remains the same, but deviations from the classical ideal elasticity are attributed to different sources and defects introduced into continuum theory. Both methods lead to the expressions for the related currents.

The nuclei responsible for the deviations from classical elasticity can be related to the defect distribution (dislocation and disclination densities), thermal excitation, some features of internal structure and different types of nuclei (e.g. electric nuclei, rotation nuclei); other deviations lead to an elasto-plastic behaviour.

Our considerations extend also on deviations from the stress symmetry and related incompatibilities; we consider the resulting equations of motion.

Key words: self-fields, plastic distortion, asymmetric stresses, constitutive relations, equations of motion.