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                        Dissipation-Consistent Approach / / by Paul Steinmann

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                        Balances -- 8 Consequences of Mechanical Balances -- 9 Virtual Work
                        -- 10 Variational Setting -- 11 Thermo-Dynamical Balances -- 12
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   Sommario/riassunto   This monograph details spatial and material vistas on non-linear
                        continuum mechanics in a dissipation-consistent approach. Thereby,
                        the spatial vista renders the common approach to nonlinear continuum
                        mechanics and corresponding spatial forces, whereas the material vista
                        elaborates on configurational mechanics and corresponding material or
                        rather configurational forces. Fundamental to configurational
                        mechanics is the concept of force. In analytical mechanics, force is a
                        derived object that is power conjugate to changes of generalised
                        coordinates. For a continuum body, these are typically the spatial
                        positions of its continuum points. However, if in agreement with the

second law, continuum points, e.g. on the boundary, may also change their material positions. Configurational forces are then power conjugate to these configurational changes. A paradigm is a crack tip, i. e. a singular part of the boundary changing its position during crack propagation, with the related configurational force, typically the J-integral, driving its evolution, thereby consuming power, typically expressed as the energy release rate. Taken together, configurational mechanics is an unconventional branch of continuum physics rationalising and unifying the tendency of a continuum body to change its material configuration. It is thus the ideal formulation to tackle sophisticated problems in continuum defect mechanics. Configurational mechanics is entirely free of restrictions regarding geometrical and constitutive nonlinearities and offers an accompanying versatile computational approach to continuum defect mechanics. In this monograph, I present a detailed summary account of my approach towards configurational mechanics, thereby fostering my view that configurational forces are indeed dissipation-consistent to configurational changes.