ON THE MODELING OF ENTROPY PRODUCING PROCESSES[*]

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Abstract. A general thermodynamic framework is presented for the study of the response of bodies undergoing entropy producing processes. In general, in such processes the natural configuration of a body, i.e., the configuration that the body would take on the removal of all external stimuli, changes. The fact that material symmetry of the body in these various natural configurations could be different allows one to model the response of bodies that cannot be described by traditional models that are in place. It is assumed that the processes take place in a manner such that the rate at which entropy is produced is maximized. Knowing how the material stores energy, produces entropy, conducts heat, absorbs or emits radiation, etc., allows one to determine the constitutive equation for the stress and other relevant quantities. The fact that the body's natural configuration changes and the form for the stress response from the natural configuration changes, leads to a lot of challenges with regard to the development of analytical as well as numerical methods for the study of the response of bodies.

Key words. Rate of entropy production, internal energy, Helmholtz potential, rate of dissipation, second law of thermodynamics.

AMS subject classifications. 80A17, 74C10, 74C15, 74C20, 76A05, 76A10, 76A15.