Meeting: 1006, Lubbock, Texas, SS 16A, Special Session on Partial Differential Equation and Its Application in Biomedical Study

1006-74-191 **T. Sendova*** (sendova@math.tamu.edu), Texas A&M University, Department of Mathematics, College Station, TX 77843, and **J. R. Walton**. *Constitutive Restrictions for Isotropic Hyperelastic Material Modeled Using Invariants of Logarithmic Strain.*

We discuss various constitutive restrictions on the strain energy function W for an isotropic hyperelastic material, in the case when W is defined in terms of the invariants of the logarithmic strain, introduced by Criscione at al. (J. Mech. Phys. Solids 48 (2000) 2445). These invariants (specifying the *amount of dilatation* (K_1), the *magnitude of distortion* (K_2) and the *mode of distortion* (K_3)) are characterized with important orthogonality properties which allow the strain energy function W to be determined with improved accuracy. Central for the analysis of necessary or sufficient conditions for strong ellipticity is the derivation of a convenient expression for the Fréchet derivative of the logarithmic strain tensor. The derived restrictions are illustrated by applying them to a model for rubbery material proposed by Criscione at al. Motivation for this study came from attempts to model the large deformation behavior of soft tissue. (Received February 14, 2005)