Title: Quasistatic Nonlinear Viscoelasticity and Gradient Flows

Abstract: We consider the equation of motion for one-dimensional nonlinear viscoelasticity of strain-rate type under the assumption that the stored-energy function is λ-convex, which allows for solid phase transformations. We formulate this problem as a gradient flow, leading to existence and uniqueness of solutions. By approximating general initial data by those in which the deformation gradient takes only finitely many values, we show that under suitable hypotheses on the stored-energy function the deformation gradient is instantaneously bounded and bounded away from zero. Finally, we discuss the open problem of showing that every solution converges to an equilibrium state as time $t \to \infty$ and prove convergence to equilibrium under a nondegeneracy condition. We show that this condition is satisfied in particular for any real analytic cubic-like stress-strain function.