1075-74-13 **Alexey Miroshnikov*** (amiroshn@math.umd.edu) and **Athanasios Tzavaras** (tzavaras@tem.uoc.gr). *A variational approximation scheme for radial polyconvex elasticity that excludes interpenetration of matter.*

The equations of elastodynamics is a system of conservation laws that describes the evolution of an elastic body expressed by the motion $y(x,t)$. In general, the stored energy function $W(\nabla y)$ and hence the entropy $\eta(v, \nabla y) = \frac{v^2}{2} + W(\nabla y)$ are not convex which causes various difficulties in applying the general theory of conservation laws.

It turns out that elastodynamics with polyconvex stored energy can be embedded into a larger symmetric hyperbolic system and visualized as constrained evolution leading to a variational scheme. This was explored earlier by S. Demoulini, A. Tzavaras and D. Stuart for three dimensional elastodynamics. The above results do not take into account the constrain that a physically realizable motion $y(x,t)$ must satisfy $\det \nabla y > 0$ which ensures that material cannot be compressed into a point.

We study radial elastodynamics for isotropic elastic materials. We present an enlarged system with additional transport identities associated with null-Lagrangians and construct a variational scheme that decreases the total mechanical energy and at the same time leads to physically realizable motions that avoid interpenetration of matter. (Received June 30, 2011)