

---

**ALEXEI CHEVIAKOV**, University of Saskatchewan

*Nonlocally related PDE systems and exact solutions for one-dimensional nonlinear elastodynamics*

We start from a derivation of complete dynamical PDE systems of one-dimensional nonlinear elasticity satisfying the principle of material frame indifference, in Eulerian and Lagrangian formulations. We then consider these systems within the framework of nonlocally related PDE systems, and derive a *direct relation* between the Euler and Lagrange systems within that framework. Moreover, other equivalent PDE systems *nonlocally related* to both of these familiar systems are obtained.

Point symmetries of three of these nonlocally related PDE systems of nonlinear elasticity are classified with respect to constitutive and loading functions. Consequently, new symmetries are computed that are: nonlocal for the Euler system and local for the Lagrange system; local for the Euler system and nonlocal for the Lagrange system; nonlocal for both the Euler and Lagrange systems.

For realistic constitutive functions and boundary conditions, we use the obtained nonlocal symmetries to construct new exact dynamical solutions, and prove that they *do not* arise from invariance under local symmetries.

This is a joint work with G. Bluman (UBC) and J.-F. Ganghoffer (INPL, Nancy, France).