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Alexander Panchenko* (panchenko@math.wsu.edu) and **Lyudmyla Barannyk**. *Mesoscopic continuum mechanics of particle systems*. Preliminary report.

The main question addressed in the talk is how to obtain closed form continuum equations governing spatially averaged dynamics of many-particle systems. The underlying ODEs are classical Newton equations of motion. The continuum balance equations for the average density, momentum, and energy were derived by Noll, Hardy, Murdoch and others. These equations are exact, but they do not form a continuum model in the true sense of the word: calculation of stress and heat flux requires solving the underlying ODE system. To produce continuum equations that can be simulated without resolving particle dynamics, we developed a closure method based on the use of regularized deconvolutions. We also present results of numerical experiments showing good agreement between our closed form flux approximations and their exact counterparts. (Received September 21, 2011)