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Abstract for an Invited Paper  
for the MAR09 Meeting of  
the American Physical Society

### **Cell Rheology and Embryogenesis Using the Subcellular Element Model<sup>1</sup>**

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I will present recent work on grid-free computational modeling of both cell biomechanics and multicellular collective dynamics, the latter in the context of gastrulation in the chick embryo. Mechanics at both subcellular and multicellular scales is modeled seamlessly with the Subcellular Element Model (SEM). The SEM is able to capture basic viscoelastic properties of cells at a semi-quantitative level, and is efficient enough to simulate thousands of cells in three dimensions allowing computational analysis of biological hypotheses regarding collective cell motion during gastrulation. Work done in collaboration with Sebastian Sandersius, Arizona State University.

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