Shlomo

Professor

Address:
Department of Mathematical Sciences
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Education

Ph.D., The Weizmann Institute of Science

Research

My research focuses on modeling and simulation of problems in material science and system biology. In materials, I am interested in grain growth where texture and grain boundary character are the main statistical properties. Their relations to material properties are one of the current efforts. Using inverse problem formulation in conjunction with HEDM data from R. Suter Lab I look into validation of classical models and their extensions. In addition I am interested in theories that bridge between models at the single grain level and theories for statistical properties. The work involves collaboration with D. Kinderlehrer and of materials science faculty at CMU.

In biology I am interested in system level problems related to immune response and physiology, especially the circulatory system. Real data from human subjects and animals is driving the questions and the mathematical approaches to be developed. Current interest include understanding of failure mechanisms in shock (hypovolemic and septic). I am interested in developing real time systems for monitoring and predicting instabilities based on mathematical models.

Select Publications

Kinderlehrer, D., Livshits, I., Manolache, F., Rollett, A. D., and Ta'asan, S., Mesoscale simulation of grain growth (Proc. Symp. Y. MRS Fall 2000, to appear).

B. Chough and S. Ta'asan, From Molecular Dynamics to Navier-Stokes and Beyond. Computational Aerosciences in the 21st Century. Kluwer Acedemic Publishers 2000.

Arian, E. and Ta'asan S., Analysis of the Hessian for aerodynamics optimization: Inviscid flows. Computers and Fluids 28 (1999) 853–877.

Haras, Z. and Ta'asan S., The large scale discretization method for time dependent partial differential equations. Computers and Fluids 28 (1999), 573–602.

Ta'asan S., From molecular dynamics to continuum models, in Multigrid Methods VI, Lecture Notes in Computational Science and Engineering No 14, E. Dick, K. Riemslagh, J. Viendeels, eds.), Springer, 1999.

Adams, B.L., Ta'asan, S., Kinderlehrer, D., Livshits, I., Mason, D., Wu, C., Mullins, W.W., Rohrer, G.S., Rollett, A.D., Saylor, D., Extracting grain boundary energy from triple junction measurement, Interface Science, 7, 321–338.

Adams, B.L., Kinderlehrer, D., Mullins, W.W., Rollett, A.D., and Ta'asan, S. 1998 Extracting the relative grain boundary free energy and mobility functions from the geometry of microstructures, Scripta Materiala, 38.4, 531–536

14-CNA-026, *Numerical Analysis of the Vertex Models for Simulating Grain Boundary Networks*, Maria Emelianenko, Dmitry Golovaty, David Kinderlehrer, Shlomo Ta'asan, C. E. Torres, *(download paper)*

13-CNA-003, *Materials Microstructures: Entropy and Curvature-Driven Coarsening*, Katayun Barmak, Eva Eggeling, Maria Emelianenko, Yekaterina Epshteyn, David Kinderlehrer, Richard Sharp, Shlomo Ta'asan, *(download paper)*

12-CNA-013, *A Theory and Challenges for Coarsening in Microstructure*, Katayun Barmak, Eva Eggeling, Maria Emelianenko, Yekaterina Epshteyn, David Kinderlehrer, Richard Sharp, Shlomo Ta'asan, *(download paper)*

11-CNA-001, *An Entropy Based Theory of the Grain Boundary Character Distribution*, Katayun Barmak, Eva Eggeling, Maria Emelianenko, Yekaterina Epshteyn, David Kinderlehrer, Richard Sharp, Shlomo Ta'asan, *(download paper)*

10-CNA-014, *Critical Events, Entropy, and the Grain Boundary Character Distribution*, Katayun Barmak, Eva Eggeling, Maria Emelianenko, Yekaterina Epshteyn, David Kinderlehrer, Richard Sharp, Shlomo Ta'asan, *(download paper)*

10-CNA-013, *Predictive Theory for the Grain Boundary Character Distribution*, Katayun Barmak, Eva Eggeling, Maria Emelianenko, Yekaterina Epshteyn, David Kinderlehrer, Richard Sharp, Shlomo Ta'asan, *(download paper)*