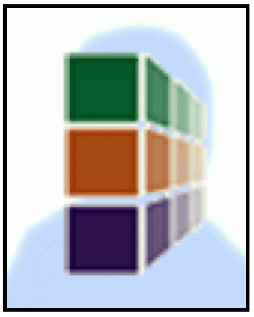

Special Guest Lectures

Parallel Computing Pressure Driven Phenomena

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Johnston Hall 338
July 30, 2008 - 01:30 pm

Abstract:
Two applications of parallel computing will be presented: (1) Molecular dynamics (MD) of pressure driven structural transformations in GaAs nanocrystals, and (2) Finite element (FE) computations of intra-ocular pressure (IOP) induced deformation of monkey optic nerve heads. After a brief experimental motivation for the work on GaAs nanocrystals the interatomic potential used is described. Following a description of the equations of motion and integration algorithms used results on the structure of the transformed nanocrystals will be presented: multiple grains, sensitivity to initial shape, and trends with increasing nanocrystal size. Finite element computations on optic nerve heads are carried out in the context of the eye disease glaucoma. This work involves a coupling of length scales to determine the indirect IOP load - the stretching of the nerve head due to its embedding in the eye-globe: FE computations of the posterior half of the eye globe using large elements feed into the computations on the nerve head with micron-scale elements. Implementation of the spatial decomposition scheme borrowed from MD and a load-balancing scheme will be described. Two models of direct IOP load on the nerve head will be presented. Results from the validated scheme of direct IOP loading include a comparison of the spatial trends in the stresses and strains in nerve heads of normal monkey eyes and the nerve head from contralateral eyes with experimentally induced early glaucoma.

Speaker's Bio:
Coming soon!

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