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SCALE BRIDGING IN SCIENCE AND ENGINEERING

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ABSTRACT

Small scale features and processes occurring at a nanometer and femtoseconds scales have a profound impact on what happens at a larger scale and over extensive period of time. In the realm of increasing need of understanding and controlling the behavior of products and processes at multiple scales, multiscale modeling and simulation emerged as one of the most important research areas in applied science and engineering. There is a growing need to develop efficient modeling and simulation approaches for multiscale problems. No single solution or approach has a promise of bridging between all length and time scales.

Papers focusing on the-state-of-the art in multiscale mathematics, modeling and simulations are invited. Topics include: spatial and temporal homogenization methods, heterogeneous multiscale methods, variational multiscale methods, coarse-grained molecular dynamics, multiresolution methods, domain bridging methods, atomistic to continuum coupling, multigrid and systematic Upscaling methods, quasi-continuum, Kinetic Monte Carlo for temporal scale bridging, adaptive multiscale methods and goal oriented error estimates, uncertainty quantification at multiple scales, error estimation in multiscale methods and practical application of multiscale methods.