
Organised by
Achi Brandt, Rehovot
Yalchin Efendiev, College Station
Oleg Iliev, Kaiserslautern

March 1st – March 7th, 2009

Abstract. The objective of this workshop was to bring together researchers working in multiscale simulations with emphasis on multigrid methods and multiscale finite element methods, aiming at achieving better understanding and synergy between these methods. The goal of multiscale finite element methods, as upscaling methods, is to compute coarse scale solutions of the underlying equations as accurately as possible. On the other hand, multigrid methods attempt to solve fine-scale equations rapidly using a hierarchy of coarse spaces. Multigrid methods need “good” coarse scale spaces for their efficiency. The discussions of this workshop partly focused on approximation properties of coarse scale spaces and multigrid convergence. Some other presentations were on upscaling, domain decomposition methods and nonlinear multiscale methods. Some researchers discussed applications of these methods to reservoir simulations, as well as to simulations of filtration, insulating materials, and turbulence.


Introduction by the Organisers

The workshop Numerical Upscaling for Flow Problems: Theory and Applications, organized by Achi Brandt (Rehovot), Yalchin Efendiev (College Station), and Oleg Iliev (Kaiserslautern) was held March 1st–March 7th, 2009. This meeting was attended by 16 participants with broad geographic representation from around the world. The workshop blended leading scientist whose essential contribution have shaped the field of numerical upscaling with enthusiastic young researchers.
Apart from many fruitful discussions, the workshop succeeded in illuminating the link between multiscale and multigrid methods, one of its major goals. While it has long been recognized that there are similarities and these areas can benefit from each other substantially, the many blackboard discussions and brainstorming sessions helped the participants understand the emerging problems in the field from a multifaceted perspective.