

Nonlocal modeling, analysis and computation

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As the world gets increasingly connected, nonlocal interactions and nonlocal modeling start to receive more attention. This lecture discusses nonlocal models, their mathematics, computation, and application. We sample recent attempts in the development of a systematic mathematical framework for nonlocal models, including basic elements of nonlocal vector calculus, well-posedness of nonlocal variational problems, coupling to local models, convergence and compatibility of numerical approximations, and applications to nonlocal mechanics and diffusion. We also draw connections with traditional models and other relevant mathematical subjects.