Multiscale Quasicontinuum Methods for Dissipative Truss Models and Beam Networks

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Mechanical models with discrete elements are frequently used to predict the behavior of discrete microstructural materials. The advantage of discrete models is that they are able to predict small-scale, individual events occurring in materials with discrete microstructures. Since discrete models are defined at small length scales, they are computationally prohibitive for engineering scale computations. Multiscale approaches can avoid this issue. The quasicontinuum (QC) approach is a multiscale approach specifically introduced for discrete (conservative) atomistics [1]. The method has recently been reformulated in terms of the virtual-power statement of non-conservative/dissipative discrete models [2]. This has introduced new application fields to the approach, since it can now be used for discrete models that include local dissipative mechanisms (e.g. useful for truss networks of electronic textile [3]) and non-local dissipative mechanisms (e.g. useful for truss networks describing bond failure and fiber sliding in paper materials [4]). Not only the work on QC frameworks for dissipative truss networks will be presented, but also how the QC method can be used for beam lattices [5]. The presentation will finish with an overview of the developments that will be made in the near future.


Short Bio

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