Multiscale finite element method for spatial network models

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Abstract: Multiphysics models on large networks are used in many applications, such as pore network models in reservoir simulation, epidemiological models of disease spread, ecological models on multispecies interaction, medical applications such as multiscale multidimensional blood flow simulations, etc. Numerical solutions to such problems are computationally expensive due to the large size of the system. We present the construction of the multiscale model order reduction of the models on spatial networks. An accurate coarse-scale approximation is generated by solving local problems in sub-networks. Results are presented for square and random heterogeneous pore-network models.