Multiscale modeling for chemical vapor infiltration process

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Abstract: A new mulitscale model is developed and analyzed to describe the isothermal chemical vapor infiltration(CVI) process in fabrication of the carbon fiber reinforced silicon carbide (C/SiC) composites. There are two kinds of pores in the preform: macro pores among fiber bundles and micro pores among fibers inside the bundles. We start from the micro model, which is based on the node-bond network and takes into account the surface chemical reaction, and aim to the macro model, which is based on the diffusion-reaction of agent gas, coupled with the evolution of the macro and micro pore porosities which describe the evolution of the pore-network structure.