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Hakima Bessaih*, University Avenue, Laramie, WY 82071, and **Yalchin Efendiev** and **Florin Maris**. *Homogenization of the evolution Stokes equation in a perforated domain with a stochastic Fourier boundary condition*. Preliminary report.

The evolution Stokes equation in a perforated domain subject to Fourier boundary condition on the boundaries of the holes is considered. We assume that the dynamic is driven by stochastic perturbations on the interior of the domain and on the boundaries of the holes. The macroscopic (homogenized) equation is derived as another stochastic partial differential equation, defined in the whole non perforated domain. Here, the initial stochastic perturbation on the boundary becomes part of the homogenized equation as another stochastic force. We use the two-scale convergence method after extending the solution with 0 in the wholes to pass to the limit. By Itô stochastic calculus, we get uniform estimates on the solution in appropriate spaces. In order to pass to the limit on the boundary integrals, we rewrite them in terms of integrals in the whole domain. In particular, for the stochastic integral on the boundary, we combine the previous idea of rewriting it on the whole domain with the assumption that the Brownian motion is of trace class. Due to the particular boundary condition dealt with, we get that the solution of the stochastic homogenized equation is not divergence free. However, it is coupled with the cell problem that has a divergence free solution. (Received February 08, 2014)