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P2.1101 Homogenization and PCE method: Application in tokamak plasma

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Homogenization methods for dielectric mixtures have existed for over two decades, but their limitations regarding the wavelength of incoming beam did not allow them to be used extensively in tokamak plasmas. We present a new method which does not have the same limitations, with application to a dielectric plasma mixture with embedded filamentary structures of different density than the background plasma. Polynomial chaos expansion (PCE) method determines, in a computationally efficient way, the evolution of uncertainty in a dynamical system due to the probabilistic uncertainty in the system parameters. By use of the PCE method we calculate the statistical properties of the output (reflection-transmission) of a slab-scattering system for uncertain parameters regarding tokamak plasma and blobs and in conjunction with the homogenization method to approximate the plasma-blob dielectric mixture.

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