Extended defect corrected averaging for highly oscillatory PDEs

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We consider parabolic partial differential equations where the support of the sources or of the inhomogenous Neumann boundary conditions undergoes an oscillatory motion. The timescale of this oscillation is much smaller than the characteristic time scale of diffusion, which is of main interest. Resolution of the smallest timescale constitutes a strong restriction on the stepsize of time integration method. Averaging techniques like stroboscopic averaging, or the heterogenous multiscaling methods, have been developed to overcome this restriction. Especially time- and space varying stiffness coefficients lead to strong timestep restrictions. We will present an extension to the defect corrected averaging with time varying periodic coefficients, that allows to use macro timesteps in the range of several periods. Both schemes make use of krylov subspace methods for the coarse scale problem and are speed up by the application of preconditioners.