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Nestor Guillen*, nguillen@math.umass.edu, and **Russell Schwab**. *Homogenization for Neumann problems for operators with singular gradient dependence.*

Consider a linear elliptic operator with highly oscillatory periodic coefficients and with a drift whose amplitude is of the same order as the frequency. We study the Neumann problem for such operators where the Neumann condition is also highly oscillatory, and analyze the behavior of solutions as the frequency goes to infinity. Such homogenization problems appear naturally in the study of stochastic processes in periodic media with reflective boundary conditions, or in the study of boundary layers for Dirichlet problems with oscillatory data. Previous works by Arisawa, by Tanaka, and by Barles-Da Lio-LionsSouganidis determined the limiting behavior in the case of an infinite strip aligned with a subspace of the Cartesian lattice. The novel idea in our analysis is translating the problem into a integro-differential problem on the boundary, by a proper study of the Dirichlet-to-Neumann map, at which the point the problem is amenable to integro-differential tools, and to ideas of Ishii used first in the homogenization of almost periodic Hamilton-Jacobi equations. (Received March 18, 2017)