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Differentiability of the effective Lagrangian for HJB equations in dynamic random environments

We prove differentiability of the effective Lagrangian for continuous space-time multidimensional directed variational problems in random dynamic environments with positive dependence range in space and time. Thus the limiting fundamental solutions in the associated homogenization problems for HJB equations are classical. For several continuous models of FPP and LPP type, our method provides differentiability of limit shapes and shape functions. This is joint work with Douglas Dow.