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Scott Armstrong and **Charles K Smart*** (smart@math.mit.edu). *Regularity and stochastic homogenization of fully nonlinear equations without uniform ellipticity.*

We prove regularity and stochastic homogenization results for certain degenerate elliptic equations in nondivergence form. The equation is required to be strictly elliptic, but the ellipticity may oscillate on the microscopic scale and is only assumed to have a finite d th moment, where d is the dimension. Showing that such an equation behaves like a uniformly elliptic equation requires a novel reworking of the regularity theory. We prove deterministic estimates depending on averaged quantities involving the distribution of the ellipticity, which are controlled in the macroscopic limit by the ergodic theorem. We show that the moment condition is sharp by giving an explicit example of an equation whose ellipticity has a finite p th moment, for every $p < d$, but for which regularity and homogenization break down. (Received September 25, 2012)