Marta Lewicka* (lewicka@pitt.edu). Expansions of averaging operators and applications.

The following approach of finding solutions to a partial differential equation $Lu=0$, proved to be quite versatile and allow to deal with several elliptic and parabolic nonlinear operators $L$:

(i) find an asymptotic expansion of suitable averaging operator on $u$, in which the appropriate order coefficient matches $Lu$;

(ii) study the related mean value equation by removing higher order error terms in the expansion;

(iii) interpret the mean value equation as the dynamic programming principle of a two-player game incorporating deterministic and stochastic components;

(iv) pass to the limit in the radius of sampling/averaging, in order to recover solutions to $Lu=0$ from the values of the game process.

In my talk, I will explain this approach in the following contexts: p-Laplacian; non-local geometric p-Laplacian; Robin boundary conditions; and weighted Laplace-Beltrami operator on a manifold. In each case, finding the appropriate averaging principle is the key starting point in order to develop (i)-(iv). (Received August 22, 2020)