Localization and multiplicity in periodic homogenization

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We propose a method for the localization of solutions for a class of non-linear problems arising in homogenization. This method combines concepts and results from the linear theory of PDEs, linear periodic homogenization theory, and nonlinear functional analysis. In particular, we use the Moser-Harnack inequality, arguments of fixed point theory and Ekeland′s variational principle. A significant gain in the homogenization theory of nonlinear problems is that our method makes possible the emergence of finitely or infinitely many solutions. Our study is motivated by real-world applications in physics, engineering and biology.

These results are based on the following joint work with Radu PRE-CUP, Faculty of Mathematics and Computer Science, Babeş-Bolyai University, Cluj, Romania :

R. Bunoiu, R. Precup, Localization and multiplicity in the homogenization of nonlinear problems, Adv. Nonlinear Anal. 9, (2020), 292–304.