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Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Montag, **02.02.2015, 14:15 Uhr**, Egerlandstr. 5, Raum 0.044

FFT-based Galerkin method for a reliable determination of homogenized material properties

Jaroslav Vondřejc

Faculty of Applied Sciences, University of West Bohemia, Plzen, Czech Republic

Abstract. FFT-based homogenization algorithms belong to fast numerical methods for evaluating homogenized (effective) properties of periodic heterogeneous materials. Originally, the method was based on a solution of the Lippmann-Schwinger type of an integral equation including the Green function for an auxiliary homogeneous problem. A numerical solution proposed by Moulinec and Suquet [2] is based on the Neumann series expansion corresponding to a simple iteration procedure. We explain the algorithm by the Galerkin method of corresponding variational formulation with an approximation space composed of trigonometric polynomials [3,5]. Techniques of numerical integrations are discussed and corresponding algorithms are supported by convergence of their approximate solutions to the solution of weak formulation [5]. Moreover, the primal and the dual variational formulations, according to Dvořák [1], allow for evaluating arbitrary accurate guaranteed bounds on the homogenized coefficients [6,4]. All theoretical results are confirmed with numerical examples.

References

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3. J. Vondřejc. *FFT-based method for homogenization of periodic media: Theory and applications*. PhD thesis, Czech Technical University in Prague, Jan. 2013.
4. J. Vondřejc. Improved FFT-based Homogenization for Periodic Media. *arXiv:1412.2033*, 2014.
5. J. Vondřejc, J. Zeman, and I. Marek. An FFT-based Galerkin method for homogenization of periodic media. *Computers and Mathematics with Applications*, 68(3):156–173, Aug. 2014.
6. J. Vondřejc, J. Zeman, and I. Marek. Guaranteed upper-lower bounds on homogenized properties by FFT-based Galerkin method. *arXiv:1404.3614*, Apr. 2014.

Prof. Dr.-Ing. P. Steinmann
Prof. Dr.-Ing. K. Willner

Lehrstuhl für Technische Mechanik
Egerlandstraße 5, 91058 Erlangen

Prof. Dr.-Ing. S. Leyendecker

Lehrstuhl für Technische Dynamik
Haberstraße 1, 91058 Erlangen