第31回早稲田大学
数学・応用数理談話会

日時：2025年5月26日(月)

16:00-17:30　講演

15:30-16:00 (tea time)

場所：早稲田大学西早稲田キャンパス

62号館1階大会議室

アクセス：https://www.waseda.jp/top/access/nishiwaseda-campus
早稲田数学応数談話会 URL: http://www.math.sci.waseda.ac.jp/math/

Long time homogenization of the wave equation in periodic media

Abstract: We report on a joint work with A. Lamacz-Keymling and J. Rauch. We study the homogenization of the wave equation in a periodic medium for long times of the order of any inverse power of the period. The unknown can be either a scalar or a vector field, while the coefficients can be purely periodic or locally periodic tensors. We obtain high order homogenized equations which include dispersive corrections that are crucial for long time accuracy. Our main tools are (i) a so-called "criminal ansatz", which generalizes to the hyperbolic setting an idea of Bakhavalov and Panasenko in the elliptic setting, (ii) an elimination process for the higher order time derivatives in the high order homogenization equation, (iii) a stability estimate for the corresponding homogenized solutions, based on frequency filtering(iv) an error estimate valid for any long times. The importance of considering high order homogenized equations to catch dispersive effects in the context of the wave equation was first recognized by Santosa and Symes and rigorously analyzed by Lamacz. Our work gives a systematic and complete analysis for all time scales and all high order corrective terms.

Speaker : Professor Grégoire Allaire
(CMAP, Ecole Polytechnique)

主催：早稲田大学理工学術院基幹理工学部数学科・応用数理学科
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