

METODI MATEMATICI PER PROBLEMI MULTISCALA NELLO STUDIO DEI MATERIALI MAGNETICI

Il corso è dedicato principalmente ad introdurre alcuni metodi matematici di largo impiego in problemi multiscala di fisica e ingegneria. Verranno trattati i concetti base relativi alla teoria della Gamma-convergenza e dell'omogeneizzazione per problemi di minimo e per equazioni differenziali. Completeranno il corso alcune lezioni dedicate alle applicazioni nello studio di materiali magnetici.

MATHEMATICAL METHODS FOR MULTISCALE PROBLEMS IN THE STUDY OF MAGNETIC MATERIALS

The course is mainly devoted to introduce some variational methods widely used in the treatment of multiscale problems of physics and engineering. We will discuss the fundamental definitions and properties of Gamma-convergence theory and of homogenization theory for minimum problems and differential equations. The theoretical background will be complemented by some lectures devoted to applications to the study of magnetic materials.

Bibliografia / References G. Bertotti: Hysteresis in Magnetism. Academic Press, 1998. O. Bottauscio, A. Manzini: Electromagnetic phenomena in heterogeneous media: effective properties and local behavior, J. Appl. Phys., 100(2006). O. Bottauscio, A. Manzini: A Micromagnetic Solver for Large-Scale Patterned Media Based on Non-Structured Meshing. IEEE Trans. Magn. 48 (2012) 2789-2792. A. Braides, Gamma-convergence for beginners, Oxford Lecture Series in Mathematics and Its Applications, 22. A. Braides, A. Defranceschi, Homogenization of integral functionals, Oxford University Press, 1998. G. Dal Maso, An introduction to Gamma-convergence, Birkhauser, 1993. G. Dal Maso, L. Modica, Nonlinear stochastic homogenization, Ann. Mat. Pura Appl. 144 (1986) 347-389.