Preface to the Second Edition

This second edition takes advantage of several comments received by colleagues and students. With respect to the first edition (published by SIAM in 2006) several new sections have been added and the organization of the material is now slightly different. The section on capacity theory and elements of potential theory has been completed by the notions of quasi-open sets and quasi-continuity. We also have increased the number of examples in Section 6 (the linearized elasticity system, obstacles problems, convection-diffusions and semilinear equations, ...). Section 11, devoted to the relaxation theory, has been completed by a section on mass transportation problems and the Kantorovich relaxed formulation of the Monge problem. We have added a subsection on stochastic homogenization to the section devoted to the Gamma-convergence: we establish the mathematical tools coming from ergodic theory and illustrate them in the scope of statistically homogeneous materials. Section 16 has been augmented by two examples illustrating the shape optimization procedure. The main novelty of this second edition is the new and very comprehensive section devoted to gradient flows, as well as the dynamical approach to equilibria.