Antonela Gonciulea, *Determinarea coeficienților omogenizați pentru o ecuație de tip eliptic / Homogenized Coefficients Determination for an Elliptic Equation*

Abstract: The theoretic researches that took place until the present have lead to the elaboration of a number of methods of homogenization concerning the behavior of certain heterogeneous materials obtained as mixtures of materials with well defined properties. For elliptical equations, the goal is to obtain an asymptotic development of the solution, which allows us to calculate the homogenized coefficients. The mathematical model which illustrates the homogenizing method in the clearest manner is a composite material. It is obtained by introducing certain fibers or inclusions from a material with better resistance properties in a matrix with very poor mechanical properties. The limit to which the solution of the considered equation tends to and the equation which this limit checks out (with some coefficients being different from the limit of those from which we started) represents the macroscopic behavior of the composite material.

By introducing the small parameter the initial problem is included in a parameterized family of problems and we will study the behavior of the solution when epsilon goes to 0. From a mechanical point of view, this means describing the transition from local or microscopic study of the phenomenon to macroscopic study. In (1.3) A is an operator with constant coefficients, called a homogenized operator, and the meaning of this terminology must be understood in this way: u_0 , which satisfies an equation with constant coefficients approximates the solution ue which is very difficult to calculate. Thus, the dependency for microscopic structure is obtained using homogenized coefficients.

Rezumat: Cercetările teoretice de până în prezent au dus la elaborarea mai multor metode de omogenizare privind comportarea unor materiale eterogene obținute ca amestecuri de materiale cu proprietăți bine definite. În cazul ecuațiilor de tip eliptic se încearcă obținerea unei dezvoltări asimptotice a soluției, ce permite calculul coeficienților omogenizați.

Cuvinte cheie: omogenizare, coeficienți omogenizați, ecuație macroscopică