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AN "AVERAGE" CONCEPT IN CALCULATING THE ELASTIC COEFFICIENTS FOR COMPOSITE MATERIALS

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Rezumat. *Această lucrare propune o metodă nouă, originală constând în considerarea unui concept de „medie" în calcularea componentelor matricei rigidităţii în cazul barei compozite, cu două faze, când proprietăţile elastice ale constituenţilor sunt cunoscute.*

Abstract. *This work proposes a new and original method consisting in considering an "average" concept in calculating the components of the rigidity matrix in case of two phases right composite bars, when the elastic properties of their constituents are known.*

Keywords: Elastic coefficients, Composite materials, Elastic properties, Industrial domains

1. Introduction

The composite materials are very useful in many industrial domains like aircraft and automotive. The elastic coefficients are determined mostly using experimental ways. A real challenge is the analytical calculus of these coefficients.

Preliminaries

Let's consider a composite material made of some many distinct constituents (phases). Those phases could present different forms of anisotropy.
Many authors [1], [2] take into account that under the action of certain external charges the material will accumulate for each phase:
This way, the S_{ik} surface between the "i" phase and "k" phase (fig. 1) the continuity conditions are:
- for the strain-stress status:

$$\sigma_{nn}^{(i)} = \sigma_{nn}^{(k)};\ \sigma_{nt}^{(i)} = \sigma_{nt}^{(k)};\ \sigma_{n\tau}^{(i)} = \sigma_{n\tau}^{(k)}; \tag{1}$$

- for the deformation status:

$$\varepsilon_{tt}^{(i)} = \varepsilon_{tt}^{(k)};\ \varepsilon_{\tau\tau}^{(i)} = \varepsilon_{\tau\tau}^{(k)};\ \varepsilon_{t\tau}^{(i)} = \varepsilon_{t\tau}^{(k)} \text{ so that } \gamma_{t\tau}^{(i)} = \gamma_{t\tau}^{(k)}; \tag{2}$$

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