

¹ COMPOSITE MATERIALS IN AUTOMOTIVE ENGINEERING – MECHANICAL BEHAVIOR OF ANISOTROPIC MEDIA

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Summary

In recent engineering practice composite materials are widely used. In such materials two or more materials are combined to obtain a new one with new properties, while individual properties of constituents remain distinguished. Such materials have notable feature that are anisotropic, having different mechanical properties in different directions. Here is special attention devoted to their mechanical behavior. Small changes of preferred direction have significant influence to stress strain relations in fibre reinforced layers.

Fibre reinforced medium is here treated as homogeneous transversally isotropic. Here is formed *Riemann-Christoffel's equation leading to three homogeneous linear algebraic equations, from which displacements amplitudes may be determined. In such way problem may be analyzed as system of homogeneous algebraic equations.*

Developed constitutive relations are accommodated for complete analysis of dynamical behavior of plates and laminates, which is one of the basic requirement of actual technical practice.

Key words: composite materials, automotive, anisotropic media

KOMPOZITNI MATERIJALI U AUTOMOBILSKOJ INDUSTRIJI - MEHANIČKO PONAŠANJE ANIZOTROPNE SREDINE

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Rezime

U savremenoj inženjerskoj praksi sve je rasprostranjenija upotreba kompozitnih materijala, kod kojih se kombinuju osobine dva ili više materijala radi dobijanja materijala sa novim karakteristikama, pri čemu se zadržavaju individualne karakteristike konstituenata. Ovi materijali imaju jednu važnu osobinu da su anizotropni, odnosno da imaju različite mehaničke osobine u različitim pravcima. U ovom radu posebna pažnja je posvećena izučavanju mehaničkog ponašanja ovih materijala. Male promene privilegovanih pravaca imaju bitan uticaj na naponsko i deformaciono polje vlaknima ojačanih slojeva.

U ovom radu je vlaknima ojačana sredina predstavljena kao homogeni, transferzalno izotropni medijum. U radu je formirana Riman Kristofelova jednačina, koja definiše tri homogene linearne jednačine, iz kojih se određuju amplitude pomeranja, kojom se problem prostiranja zapreminskih talasa svodi na sistem homogenih linearnih jednačina i predstavlja uslov propagacije.

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Izvedene konstitutivne relacije su adaptirane za sveobuhvatnu analizu dinamičkog ponašanja ploča i laminata, što je jedan od osnovnih zahteva savremene tehničke prakse u mašinstvu.

Ključne reči: kompozitni materijali, automobilski, anizotropna sredina