Project Work

VIII Semester

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELGAUM, KARNATAKA - 590 010.

"MODELLING AND NUMERICAL ANALYSIS OF PARTICULATE COMPOSITES"

(Sponsored by K.S.C.S.T, Bangalore)

A Report submitted to Visvesvaraya Technological University in the fulfillment of the requirement for the award of Degree in Bachelor of Engineering in Mechanical Engineering

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ABSTRACT

A classical problem in solid mechanics is the determination of effective properties of composite materials made up of a random distribution of isotropic and elastic spherical inclusions embedded in a continuous isotropic and elastic matrix. In the present work we have made an attempt to find out by numerical methods. The tensile load behavior of the three dimensional cubic unit cells containing about 27 non over lapping identical spheres which are randomly distributed. These unit cells called RVE's (Representative Volume Element), represent the model for micro structure of the particulate composites. Many cubic models with varying volume fractions of the reinforcements (spheres in this case) were generated. The numerical analysis tool, FEM is applied to these models to find out the stresses and strain developed. FEM solver package ANSYS was used to simulate the numerical calculations. Two types of materials were studied: a typical composite made up of glass spheres in an epoxy resin and a composite of SiC particle reinforced in Al matrix. Different loads were applied on those models and the stress strain curve was obtained. The results were used to assess the accuracies of some of the classical analytical models available in the literature.