COSMIC - Outstanding Researcher Award

for Contribution in the field of

Applied Research

Awarded on 6th Jan 2017

at AETM 2017 - Bangkok, Thailand

Dr Subrata Kumar Panda
Assistatnt Professor, Department of Mechanical Engineering
NIT Rourkela, Odisha, India

My lab's research seeks to understand the geometrical and material nonlinearity on the advanced composite structural components made of nonhomogeneous isotropic (graded materials) and orthotropic (layered structure) material. In addition, the research mainly focused on the development of novel nonlinear generic mathematical model for the analysis of curved structural panel responses (vibration, bending and buckling) under the influence of various kinds of loading as well as the nonuniform environment. Our team is constitute of graduate (M. Tech) and post graduate students (Ph.D.), senior scientists (DRDO) and expert co-investigators from the parent department and whole group working towards the achievement the previously stated goal including life cycle assessment and optimisation of the structural parameter. In this regard, few sponsoring projects are running towards the development and implementation of the desired objective. The presently developed models have been utilised to compute the desired responses including the effect of functional materials (PZT, SMA, Magnetostrictive material) to suppress the necessary responses when and where it is required. In addition, the currently developed models are engaged to compute the responses numerically with the help of MATLAB code as well as simulation model (ANSYS/ABAQUS) and compared with present experimental values to establish the inevitability of these developed models when the structure is exposed to the actual operational condition. The required lab scale experimental set-up developed for the evaluation of frequency and time-dependent deflections of the laminated composite. The process of development is on for the functionally graded materials and insertion of the unlike environmental effect. My lab pursues these investigations from several angles via few sponsoring projects from DST and DRDO. We assess the responses of the structure with a local defect like internal damage/debond. We study the distinct roles of inclusion of present nonlinear model in association with all the nonlinear higher-order terms as well as the functional material effect on final structural responses. My group also study the acoustic behaviour of laminated structure i.e., the sound pressure level using both the simulation and numerical modeling. We are on the verge of completion to give the purely numerical solution to the acoustic behaviour without using any costly commercial simulation package. In addition, the model is also developed for different scale i.e., macro to nano and the current model show very good accuracy for all different kind of material as well as scale. Based on the current research activity we have published more than 100 articles including 55 peer reviewed international journal article. I have handled nearly INR 100 Lakh as PI and few as Co-Investigation. Our research ultimately aims to discover novel numerical model to help the today's scientific community to work for different material and their modeling aspect under the combined loading effect. We use finite element based numerical modeling of different kind of advanced structural application including the combined loading and scale effect. We then experimentally compute the responses and compared our results both the available published as well as the experimental values to show the inevitability of the developed numerical model.