Editorial

Sarp Adali

Discipline of Mechanical Engineering,
University of KwaZulu-Natal,
Durban, South Africa
Email: Adali@ukzn.ac.za

Biographical note: Prof. Adali received his PhD from Cornell University in 1973 and currently he is a Sugar Millers Professor of Mechanical Design at the University of KwaZulu-Natal, South Africa. He has been a Visiting Professor at the University of California at Santa Barbara, USA a number of times and at the Marie & Pierre Curie University, France in 2001 and 2006. He is a Fellow of the American Society of Mechanical Engineers and his main research area is optimisation and analysis of composite structures. He is the coorganizer of the ICCST series of conferences (*International Conf on Composite Science and Technology 1–10*). He is a Member of the Editorial Board of a number of journals and published more than 180 journal papers and book chapters and presented papers at more than 100 international conferences and invited talks.

Editorial to the special issue

The aim of this special issue is to present some of the recent advances in the area of composite laminates operating under adverse loading conditions with the objectives of understanding the relevant failure modes and formulating reliable design tools. Laminates operating under adverse conditions are required to have the necessary load-carrying capacity to complete their missions without failure. Thus understanding the composite laminate behaviour and modes of failure when subjected to dynamic, environmental and/or thermal loads becomes an important step in their design. Such loads may lead to failure by delamination, excessive stress and fatigue, among other things and these topics are studied in the special issue papers.

The paper by Ramakrishnan et al. employs experimental and computational techniques to study the low-velocity impact response of composite laminates with nanoreinforcements. The specific material studied is Kevlar fibre-reinforced epoxy resin embedded with block copolymer nanoreinforcements. The study shows that elastomeric nanoparticles can considerably improve the resistance of Kevlar FRP under low-velocity impact. Stress analysis of a cross-ply laminate subject to thermal loading is given in the paper by Sayyad et al. using an exponential shear deformation theory. Principle of virtual work is employed in deriving the variationally consistent system of equations and boundary conditions for the problem. Explicit solutions are given for a laminated plate under a thermal load linearly varying across the thickness. The paper by Sit and Ray developes a computer code to study the stress distribution of a bridge deck subject to hygrothermal loading in the form of elevated temperature and moisture. They modelled the bridge deck as a laminated plate stiffened with closely spaced box-shaped stiffeners. Stress distributions across the thickness of the deck plate are obtained by employing a

third-order shear deformation theory and extensive numerical results are presented. Delamination initiation and propagation under cyclic load is the subject of the paper by Muc et al. The specific problem involves a laminated cylindrical shell subject to compressive cyclic loads and containing a centrally located delamination. Authors employ 3D non-linear finite element analysis combined with a fuzzy set approach to study the uncertainty in the fatigue response of the cylindrical shell.

It is hoped that this special issue will lead to further research on laminated composites subject to adverse conditions and will contribute to the improvement of design standards of composites.