Guest Editorial

This Special Issue of the *Defence Science Journal* (DSJ) on Large Deformation part II contains selected papers presented at the Symposium on Large Deformation held at the India International Centre, New Delhi, on 01 September 2002 to coincide with the 60th birthday of Prof NK Gupta, Indian Institute of Technology Delhi, New Delhi. The area of large deformation is dear to Prof Gupta and the Symposium was a tribute to his contributions in this field. Participants from academia, DRDO labs/estts, and industries actively deliberated upon the topics of impact mechanics, plastic deformation and nonlinear response of structures to impulsive loads.

The mechanics of large deformation is a complex phenomenon, and its dependence on various parameters like strain rate, inertia, history of loading, annealing and thermal processes, and geometry makes its analysis quite difficult. There is a lack of understanding of the phenomenon, and there is a need to develop formulations which are able to bring together various facets which affect the large deformations. Prof Gupta is a researcher par at excellence in the area of large deformation of metals and composites at different rates of loading. His research finds applications in design for crashworthiness of aircraft and road vehicles, design of protective armours, and the analysis of metal-forming problems.

This Special Issue has been published in two parts. Both the parts published as January and April 2003 Issues of DSJ contain eleven papers each. In the present issue, Velmurugan and Gupta have carried out a comparative study of metallic and composite shells based on deformation and energy absorption characteristics. The parameters considered for analysis include effective crushing length, total energy absorbed during the crushing process, and the Euler buckling length in metallic shells. In the paper by Khan, *et al.*, oblique impact of projectile on thin aluminium plates has been studied. Based on the experimental results, an analytical model has been developed to predict the residual velocity of the projectile and the ballistic limit of the plate in oblique impact. The paper by Madhu, *et al.*, deals with an experimental study of normal and oblique impacts of an ogive shaped hard steel projectile on single and layered plates of mild steel and aluminium. Observations on target damage and measurements of incident and residual velocities for different angles of impacts are also presented. In the paper by Dube, *et al.*, a unified general formulation of all higher-order theories has been presented for geometrically nonlinear response of cross-ply laminated plates, based on a single polynomial expansion of displacements in the thickness coordinate z. A general purpose program for linear static deflection and stress response under transverse static load, natural frequencies for transverse-free oscillations and buckling load for static in-plane load has been developed for all higher-order laminated plate theories. The paper by Gupta, *et al.* discusses the use of SMA wires in the fibre-reinforced composite shaft for modifying shaft stiffness properties. The comparison of experimental results with the established analytical results indicates feasibility of vibration control using the properties of SMA.

Narasimhan and Pandey present observations from nonlinear finite-element analysis of adhesively bonded lap joints considering elasto-viscoplastic constitutive model of adhesive material based on a pressure-sensitive (modified) von Mises yield function. Sen, *et al.* discuss the propagation of small disturbance waves in a fluid flow across the junctions between the rigid and the compliant panels with analytical jump conditions. Sridhar, *et al.* have studied the simulation of particle impact with a wedge in dilute solid-liquid flow. The two-dimensional, steady, laminar carrier-phase flow has been determined by Galerkin finite-element method using Newton's iteration for primitive variables, pressure, and velocity. Siddiqui and Ahmad have studied the dynamic behaviour of tension leg platforms under impulsive loading. Tension leg platforms are found to be the most suitable type of oil drilling platforms. Jain and Agarwal have carried out dynamic analysis of offshore spar platforms. The response analysis was performed in time domain to evaluate the dynamic behaviour of moored spar platform as an integrated system using the iterative incremental Newmark's method. Husain, *et al.* in their paper have investigated the influence of diameter of rigid hemispherical headed punches on circular shaped miniature samples of medium carbon steel, in the small punch test. The finite-element model was validated by comparison with experimental data for punch displacement.

We greatly value and appreciate the initiative taken by Dr Mohinder Singh, Director, DESIDOC and his editorial team of DSJ in bringing out this Special Issue in two parts.

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