Guest Editorial

This Special Issue of the *Defence Science Journal* on Large Deformation–I contains selected papers presented at the *Symposium on Large Deformation* held on 1 September 2002 at the India International Centre, New Delhi to coincide with the 60th birthday of Prof NK Gupta, Professor of Applied Mechanics at the Indian Institute of Technology Delhi, New Delhi. The area of large deformation is dear to Prof NK Gupta and the Symposium was a tribute to his contributions in this field. Participants from academia, Defence Research and Development Laboratories and industry 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. Professor Narinder Kumar Gupta is a researcher par excellece in the area of large deformation of metals and composites at different rates of loading. His researches find applications in design for crashworthiness of aircraft and road vehicles, design of protective armours, and the analysis of metal forming problems.

This Special Issue of *Defence Science Journal* on Large Deformation is being published in two volumes. Volume 1 contains 11 papers on the subject. Jones in his paper examines the responses of circular and square plates struck by a rigid mass at the plate centre with a sufficient initial kinetic energy to produce large inelastic deformations. Xiao, *et al.* in their paper used a self-consistent Eulerian rate-type elastoplastic model based on the logarithmic rate to study finite bending of a compressible elastic-perfectly plastic rectangular block. Metallic and non-metallic tube structures are being used as energy absorbers in road and rail vehicles or aircraft. These achieve a controlled reduction of the kinetic energy for the pupose of limitation of critical passenger acceleration and injuries. The paper by MMA Khan, *et al.* presents a curved fold model with variable straight length for the axisymetris crushing of thin frusta.

The paper by Ahmed and Sekhon incorporates the concept of adaptive meshing for finit-element analysis of the deep-drawing processing. The post-processing for determining more accurate solutions is done by fitting a higher order polynomial expression to the finite-element solution in nodal patches. The paper by Prakash, *et al.* deals with the finite-element analysis of permanent deformation occurring during projectile impact on plates. The refinement of the mesh is carried out to capture the zones of high stress and strain gradient and to limit the solution error. The paper by U Khan, *et al.* presents a simplified model for calculating the penetration depth, scabbing, and perforation thicknesses forconcrete targets. These models consider the dynamic strain rate effect in the estimation of damage.

In the paper by Nagesh, a degradation model incorporated into the finite-element analysis of the pressure vessel based on a progressive fracture criterion, has been discussed. Senthil and Mahajan present mathematical modelling of avalanche initiation mechanism as a prerequisite for accurate prediction of an avalanche. Also, the possibility of using cohesive element approach to the problem of crack propagation as a reason for slab failure and occurrence of an avalanche is discussed. Sathish, *et al.* present the experimental and analytical studies carried out on yielding-type, elasto-plastic passive energy absorbing elements to be used in a passive energy-dissipating device for the control of large seismic deformations of pipelines subjected to earthquake loading. The paper by Islam and Ahmed presents an investigation of the seismic response of articulated offshore tower by spectral analysis method, which is based on the principle of random vibration and where seismic excitation is assumed to be a broadband stationary process. Rajesh Kumar and Chander Shakher in their paper present measurement of dynamic deformations in a rectangular plate fixed at one end using digital-speckle pattern interferometry using a new filtering scheme based on combination of average/medium filtering and Symlet wavelet filtering to improve measurement accuracy.

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