# NUMERICAL STUDIES TO ANALYZE THE DEFORMATION BEHAVIOR OF EPOXY-CLAY NANOCOMPOSITE UNDER HIGH VELOCITY IMPACT USING CONTINUUM DAMAGE MECHANICS

Jasra, Yogeshwar[1], Kumar, Pardeep[2], and Saxena, Ravindra Kumar[2]*
[1] Mechanical Engineering Department, Sant Longowal Institute of Engineering and Technology, Longowal, India
[2] R V Industries, Goraya, India
* Ravindra Kumar Saxena(rksaxena04@yahho.com)

**Keywords***: Continuum damage mechanics, Epoxy-clay nanocomposite, Fracture*

High strain deformation behavior studies in the composite material always hold importance in many areas of science and technology. The process of fracture initiation and propagation in the Epoxy-clay nanocomposite when impact by a high-velocity projectile is simulated in the present research. The impact process results in the crack propagation and fragmentation in the composite material. During the impact process, the target material undergoes large deformation which results in the evolution of the ductile damage and ultimately leads to the fracture. The fracture behavior in the material is simulated using continuum damage mechanics at the velocity range of 200-600 m/sec. The effect of presence of nano-clay inside the matrix and the effect on the ballistic performance has also been presented in the present study. The process of deformation and the effect of reinforcement on the fracture mode has also been discussed in detail. It is found that the reinforcement inside the matrix overall enhances the high strain rate performance. The damage initially grows under the impact areas. Later, the cracks propagate in the target body. The effect of reinforcement is incorporated in the form of mechanical properties. The deflection and residual velocity of the projectile has been evaluated.