

Collision Between Two Deformable Structures

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The studies on dynamic plasticity of structures in the past 50 years mainly concerned a single structure's response to a prescribed impulsive/pulse loading or to impact of a rigid projectile. However, a real collision always involves two deformable structures. Hence, aiming to extend our knowledge to these realistic problems and to reveal some common features of the collision between two deformable structures, we systemically explored this new area with a focus on the energy partitioning between two colliding structures. The complete and modal solutions on beam-on-beam collisions were first constructed and their validity was illustrated. Various local contact models were then proposed and implemented in the solution of structures' global deformation. The study of a mass-spring colliding system reveals some fundamental features of the collision phenomena. These fundamental features were further examined in a more complex ring-on-beam collision, analyzed by using a mass-spring finite difference (MS-FD) model.

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