Title:
Low-velocity impact analysis of sandwich plates with composite face sheets and auxetic core

Abstract:
This study is about sandwich structure of core of Auxetic (a material with a negative poisson's ratio) is used as a matter of stretching that expands in one direction or in all directions, and by contracting one point, all of them contract in all directions. For finding the govern relationships, and for analytical method, the classical theory is used and those equations are obtained. Also for modeling the impact, Hertz contact law was used in loading and unloading, the law of SUN and Yung have been used, since the resulting equations were time dependent, they were solved by numerical methods. Due to nonlinearity of the equations, we also have been used iterative methods. At the end, by providing an algorithm for nonlinear equations, these equations were solved. In continuous due to more accurateness of numerical results of Abaqus software that is based on elasticity theory, than semi analytical method of other cases of boundary conditions such as variable staddles, poisson's ratio changes and velocity of impact, Abaqus software has been used at the end, in section of results of analyse of sandwiched panel by different values, poisson's ratio was negative that while poisson's ratio changes from positive value to negative one, a notable change is created in amount of reaction force and leap in impact place. So that contact force increased 19%. In the other hand, we observe that by increasing the negative amount of poisson's ratio, there is not very much differences in reaction of impact when hitter hits to some where except of middle of plate and nearly the sides, the leap value decreased.

Keywords:
Low velocity, Sandwich composite panel, core of Auxetic, out of centre impact, analytic solution, Finite elements, contact law.