

Collapse study of thin-walled polygonal section columns subjected to oblique loads

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The present paper deals with the collapse simulation of aluminium alloy extruded polygonal section columns subjected to oblique loads. Oblique load conditions in numerical simulations are applied by means of impacting a declined rigid wall on the tubes with no friction in this task. The explicit finite element code LS-DYNA is used to simulate the crash behaviour of polygonal section columns that are undergoing both axial and bending collapse situations. In order to validate LS-DYNA results the collapse procedure of square columns is successfully simulated and the obtained numerical results are compared with actual available experimental data. Mean crush loads and permanent displacements corresponding to load angles have been investigated, considering columns with square, hexagonal, octagonal, decagonal, and circular cross-sections. It is shown that the octagonal cross-section has better characteristics from the point of view of vehicle crashworthiness under oblique load conditions