The numerical simulation of axial crumpling in grooved circular PVC tubes under static compression

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Abstract

In the simulation works described in this paper the ANSYS finite element package is used to investigate the compressive properties and crushing response of circular grooved PVC tubes subjected to static axial testing. A series of models was created to simulate the static tests performed in the laboratory using PVC tubes with and without grooves featured by the same material combination and external cross-section dimensions, but different grooved length. Simulation works focused on modelling the modes of collapse observed in the series of static compression tests. Satisfactory level of agreement between numerical analysis and experimental results were obtained regarding the main ultimate characteristics of the tested PVC tubes such as peak compressive load and the overall crushing response as the finite element models were refined several times in order to obtain optimum results.