DYNAMIC IMPACT LOADING ON ALUMINUM SPHERICAL SHELL: STUDY OF THE MAJOR BENDING AND EDGE REGION USING NUMERICAL MODELS

José A. Santelli[a], Horacio M. Mirassou[a], Gustavo J. Cazzola[a]

[a] *Grupo GITEVE, Centro CIDIV, Facultad Regional Pacheco, Universidad Tecnológica Nacional, Argentina, jsantelli@docentes.frgp.utn.edu.ar, https://www.frgp.utn.edu.ar/*

Keywords: Dynamic Analysis, Finite Element Method, Buckling, Impact

Abstract. The dynamic impact loading on shell structures (ranging from a low-speed impact, passing to intermediate loading, and finally to high-energy impact), is studied in this work, in the latter shearing is predominant, and the impacting object passes through the shell structure, separating material. In this work, all the loading conditions are studied in an aluminum spherical shell set up, using finite element method, focusing on the dimple caused by high-energy impact, correlating the numerical models with theoretical and experimental models. In the case of high-energy impact, the major bending areas and the transition between the undeformed and major bending are studied. Shell finite elements and Dynamic Analysis are used. The findings are that the experimental, theoretical, and numerical models are in good agreement, leading the latter to the analysis of more complex structures, such as vessels.