

Guadalupe Vadillo Martín

Models of ductile fracture in static and dynamic conditions.

University Carlos III of Madrid (Spain) - 2007

Contact : gvadillo@ing.uc3m.es

In this thesis, some problems about numerical simulation of the mechanical behaviour of materials whose fracture mechanisms are related to the nucleation, growth and coalescence of voids have been analyzed. This kind of analysis must be performed in many engineering applications like metal forming and cutting, light vehicles structures (automobiles, helicopters) under crash, crack growth in thin panels, typical in the aircraft industry, high-speed impact on metallic armours and others. In particular, a consistent integration algorithm of Gurson's constitutive equations considering strain rate and thermal effects has been developed. Also, a modified GTN model that consider that some parameters of the model are no constant but dependent of stress state has been formulated. Finally, the influence of the porosity on cavitation instabilities in metallic materials has been analyzed. In previous work, this kind of instabilities has been predicted considering only one void contained in an unbounded solid. The developed algorithms have been implemented in a Finite Element commercial code and they have been validated with experimental results

www.dymat.org