# ACOUSTICS2008/2755
# Nonlinear vibrations of impacted rectangular plates. Comparison between numerical simulation and experiments

Cédric Camier[a], Kevin Arcas[b] and Stefan Bilbao[c]
[a]ENSTA, Chemin de la Hunière, 91761 Palaiseau cedex, France
[b]ENSTA, Chemin de la Hunière, 91761 Palaiseau, France
[c]University of Edinburgh, Room 7306B, JCMB, King's Bldgs., Mayfield Rd., EH9 3JZ Edinburgh, UK

Large amplitude vibrations of free-edge rectangular plates, subjected to an impulse excitation is addressed. In particular, this work is devoted to the analysis and simulation of a nonlinear von Kármán plate equations and by associate experimental investigations. Time domain simulations are achieved using implicit finite differences (FD) schemes recently developed by Bilbao. These energy-conserving methods guarantee the stability of the algorithm. To compare with simulations results, an experimental setup which allows reproducible impulse excitation and measurements by laser vibrometry has been developed. The time history of the force applied to a rectangular steel plate is recorded and this signal is used as excitation term in the simulations. We perform a parametric study, with both experimental and numerical approaches, by increasing gradually the amplitude of forcing. Non-linear phenomena, such as pitch glide and chaotic behaviour are observed and discussed.