



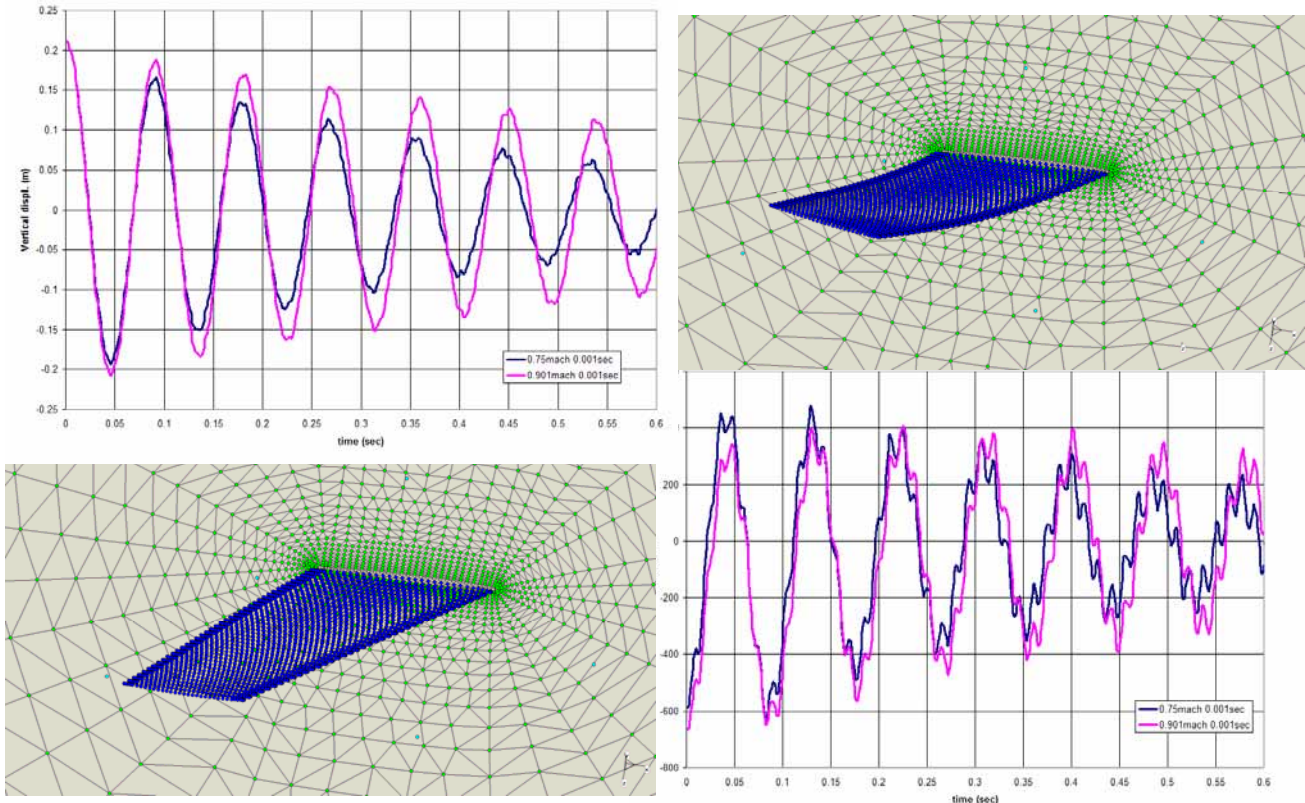
ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ

ΣΧΟΛΗ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

Δομοστατικός Σχεδιασμός και Ανάλυση των Κατασκευών

ΑΛΛΗΛΕΠΙΔΡΑΣΗ ΡΕΥΣΤΟΥ - ΚΑΤΑΣΚΕΥΗΣ **(FLUID STRUCTURE INTERACTION ANALYSIS)**

FLUID APPROXIMATION



Post-Graduate Thesis

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A significant part of a fluid-structure interaction problem is the fluid solver algorithm which plays an important role in our numerical applications. There are many different approaches for discretizing the fluids dynamic equations in space and time; some of them have been developed in the last two decades. In contrast with the structural dynamic equations, the fluid flow dynamic equations are not self-adjoint and when trying to discretize them, we get numerical oscillations in our solution.

For the reasons above, we try to understand, through this Post-Graduate Thesis, the fluid flow dynamics concept and analyze the most commonly used discretization methods. The purpose of this theoretical analysis is to present the advantages and disadvantages that these methods have and understand why computational fluid dynamics is so difficult to implement in rather large problems. Finally we present the results of a numerical simulation of an FSI problem which we simulate by using algorithms that we've created for this purpose. This FSI problem is a benchmark aeroelasticity problem for the estimation of the aerodynamic response of the AGARD wing 445.6.

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