ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΙΑΣ
ΠΟΛΥΤΕΧΝΙΚΗ ΣΧΟΛΗ - ΤΜΗΜΑ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

ΣΕΙΡΑ ΕΠΙΣΤΗΜΟΝΙΚΩΝ ΔΙΑΛΕΞΕΩΝ
ΑΚΑΔΗΜΑΙΚΟΥ ΕΤΟΥΣ 2016-2017

A topic related to Blue Energy and Blue Growth: Hydrodynamics and near-trapping effects in arrays of multiple elliptical cylinders in waves

Prof. Ioannis K. Chatjigeorgiou

NTUA - Naval Architecture & Marine Engineering

Wednesday 03-05-2017, 12:00-13:00
Room A Civil Engineering Department

Summary: The talk will commence with the discussion on Blue Growth and will emphasize on the increasing potential of the Blue Energy sector. This sector refers to the enormous sustainable energy potential of the sea. Indeed, today a *Wind of Change* has been observed in the investments carried out towards the exploitation of offshore wind energy. Meanwhile, the equally attractive wave energy exploitation remains a great challenge. The topic of the lecture has applications in both wind and wave energy.

In particular, the purpose of the study presented is the investigation of the hydrodynamic interactions induced by arrays of elliptical cylinders subjected to regular waves with particular interest given in wave-trapping effects. Any array of elliptical cylinders, in accord with arrays of circular cylinders, is potentially a wave trapping configuration, which is connected mainly i) with sharp amplifications in all modes of hydrodynamic loading (both forces and moments) and ii) strong free-surface elevations in the liquid regions between the cylinders and on the cylinders' surfaces accordingly. The above points are directly related to the design of offshore structures but also the effective design of wave energy converters.

The solution methodology employs linear potential theory and is based on pure analytic considerations. The interaction phenomena are approached by the use of the Mathieu functions addition theorem. A linear matrix equation for the calculation of the expansion coefficients of the diffraction component(s) is used accordingly to trace the wavenumber(s) under which trapped modes may be stimulated to induce wave trapping in the array and reduction of the energy radiated to the far-field making thus possible to exploit the huge wave potential trapped in a confined liquid region.