RESEARCH AND POSTGRADUATE SUPPORT DIRECTORATE

Cordially invites you to a Guest Lecture on **Wave Energy Estimation** presented by **Professor Jonathan Blackledge**, Deputy Vice-Chancellor (Research), University of Kwa-Zulu Natal (UKZN)

Professor Jonathan Blackledge holds a PhD in Theoretical Physics from London University and a PhD in Mathematics from the University of Jyvaskyla. He has published over 250 scientific and engineering research papers including 14 books, has filed 15 patents and 18 Technologies to License, 5 of which have been used to establish new start-up companies. A past supervisor to over 300 MSc/MPhil and 56 PhD research graduates, he holds Fellowships with leading Institutes and Societies in the UK including the Institute of Physics, the Institute of Mathematics and its Applications, the British Computer Society and the Royal Statistical Society.

DATE: 02 February 2015
TIME: 12:00 to 13:00
VENUE: Research Boardroom, Steve Biko Campus, Gate 1

Please RSVP to vanesh@dut.ac.za on or before 30 January 2015

ABSTRACT

Sea surface waves can provide is a continuous source of energy if suitable technologies can be found that yield relatively cheap wave energy conversion 'products' that are simple to manufacture on mass. In order to help achieve this, it is necessary to understand the dynamics of wave motion. Most work in this area has focused on two distinct approaches:

- computational fluid dynamics;
- statistical modelling.

While the former approach is 'driven' by the underlying physics, it is usually computationally demanding. On the other hand, although statistical modelling is useful for setting tolerances on the designs of wave energy converters, for example, it does not provide results that are physically significant in terms of how waves are generated or how they propagate and interact. Moreover, both approaches fail to explain rare but extreme events such as *freak* or *rogue* waves which have only relatively recently been verified experimentally.

After providing an overview of the technologies being developed for wave energy generation, the lecture introduces methods of modelling sea surface waves with the aim of simulating their dynamical and spatial characteristics from both a linear and nonlinear perspective. This involves understanding how wind energy is converted into wave energy. A study is therefore made on the statistics of wind velocity data and a new stochastic model developed in which non-Gaussian processes are introduced, characterised by the *Levy index*. Results are presented of a correlation that appears to exist between the Levy index for the wind velocity and the corresponding wave Energy Density which provides a new and original approach to assessing the cost effectiveness of ocean regions considered suitable for farming wave energy.