

Kolloquium für Mechanik

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Titel: **Energy Harvesting based on dynamics of a parametric pendulum**

Abstract

There are renewable energy technologies available today to capture solar, wind, biomass, geothermal and hydro energy. However, some technical issues such as robustness, efficiency, ecosystem impact still form constraints as well as the cost remain the main challenges. One of the most promising, yet almost totally unexploited, sources of clean, unlimited energy is the Ocean Waves Energy. Much higher energy density compared to solar or wind energy and slower variations constitute the reasons why it is considered having great potential. However, only a handful of devices have been commercialized so far with some limited success. The electricity cost is estimated at TEN times higher than the conventional coal-produced one, which along with the occasional severe weather conditions and technical issues explain its slower growth. According to UK Carbon Trust reports there are "a need for cost reduction" and "next generation technology" of wave energy converters.

In this presentation a new concept of a Wave Energy Converter is discussed. The original concept is based on the parametric excitation of a pendulum by ocean waves and direct conversion of waves' motion into rotational motion. However, the waves motion can barely be considered as deterministic and thus their random nature has to be accounted for. Will the rotational motion be sustainable in the presence of randomness? The typical average value of the wave frequency is 0.1Hz, implying that a nearly 100m long pendulum would be required. Is it possible to reduce the size of the device? It has been shown in the deterministic case that the rotational motion can start only at certain values of waves' amplitude and frequency, which are almost impossible to encounter at a regular sea state. Is there a device's design that sustains rotational motion at a regular sea state? In this presentation we try to give answers to these and other related and challenging questions.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Alexander Fidlin