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The resonant motion of 3 DOF mass-offset submerged buoy in regular waves

Abstract Since the Oil Crisis of the 1970s, wave energy has been regarded as a renewable power source. Compared with solar and wind energy, the power carried by wave oscillations are more continuous and predictable. Of all the Wave Energy Converter (WEC) categories, the point absorbing WEC is widely used in wave energy industry. This kind of device floats on the surface of the water or submerges below the water surface, held in place by cables connected to the seabed. Buoys use the rise and fall of swells to drive hydraulic pumps and generate electricity. For most published research on the point absorbing WECs with single-tether power take-off device (PTO), only heave motion was considered. This is mainly due to the fact that heave motion can easily transfer to the PTO. This presentation will demonstrate the concept of utilising asymmetric mass distribution to enhance coupling of buoy’s motion, and consequently extract more energy from waves, compared to a generic buoy with uniform mass distribution.

This is a joint work with Benjamin Cazzolato, Boyin Ding and Zebb Prime.