6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11-15 June 2018, Glasgow, UK

Forces on a submerged sub-sea tidal kite in surface proximity

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Sub-sea tidal kites, while still at an early stage of development, might be an efficient and cost effective way of extracting energy from marine currents [3]. During normal operating conditions the kite is positioned deep in the water column and would ideally be built neutrally buoyant. For operation and maintenance (O&M) situations, or if a fault occurs, it is important to surface the kite in a controlled manner. While the behaviour of wing like profiles in currents is well understood, the assessment of the behaviour in surface proximity and under wave action is not trivial [1].

We employ an efficient boundary element code called *pan*MARE [2] to simulate the effect of surface proximity and wave current interaction on a sub-sea kite. Comparison with experimental data from [1] demonstrates the suitability of the method to simulate forces on a submerged foil for varying immersion depths and angles of attack. Simulations are then performed to investigate the combined effect of waves and current to inform on suitable met-ocean conditions for kite retrieval.

Keywords: *Boundary Element Method, panmare, marine renewable, wave current interaction*

REFERENCES

[1] M. Daskovsky. The hydrofoil in surface proximity, theory and experiment. *Ocean Engineering*, 27(10):1129–1159, 2000. cited By 6.

[2] D.F. González, J. Bechthold, and M. Abdel-Maksoud. Application of a boundary element method for wave-body interaction problems considering the non-linear water surface. volume 7A-2017, 2017. cited By 1.

[3] C. Zambrano. Lessons learned from subsea tidal kite quarter scale ocean trials. In *WTE16 - Second Workshop on Wave and Tidal Energy*, Valdivia, Chile, November 2016.