Multiobjective Optimisation of a Wave Energy Farm

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Abstract

This paper presents the optimisation of a wave energy farm configuration and its application in electrical network stability analysis. The influence of the spatial distribution in a wave energy farm power output, has been demonstrated. On the other hand, compliance with the limit values imposed by the European Systems Operator (ENTSO-E) for the stability of power systems, is a problem to be solved by the electrical generation devices with renewable sources. The aim of the work is designing a farm configuration simultaneously maximising the output of electric power and minimising the frequency excursions. Taking this into account, a multiobjective optimisation using evolutionary algorithms has been applied [1]. Hydrodynamic and PTO computations have been done using the Boundary Element Method (BEM). Through the methodology described by [2] for the assessment of the total output power produced by a wave farm, different spatial wave farm configurations have been tested, obtaining the total produced power (rst maximised tness function). On the other hand, that electrical power is injected in a weak and isolated power system, where the frequency excursion analysis has been carried out in order to minimise its value (second tness function). As a solution we have obtained a non-dominated set of optimal wave farm configurations.

References

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