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A numerical framework for modelling floating wind turbines<sup>1</sup> AXELLE VIRE, JIANSHENG XIANG, MATTHEW PIGGOTT, JOHN-PAUL LATHAM, CHRISTOPHER PAIN, Imperial College London — This work couples a fluid/ocean- and a solid- dynamics model in order to numerically study fluid-structure interactions. The fully non-linear Navier-Stokes and solid-dynamics equations are solved on two distinct finite-element and unstructured grids. The interplay between fluid and solid is represented through a penalty force in the momentum balances of each material. The present algorithm is novel in that it spatially conserves the discrete penalty force, when exchanging it between both models, independently of the mesh resolution and of the shape-function orders in each model. This numerical framework targets the modelling of offshore floating wind turbines. Results will be shown for the flow past a moving pile and an actuator-disk representation of a turbine.

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