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Simulating structures within MIKE FM
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Abstract

MIKE FM represents a state-of-the-art modelling system capable of simulating hydrodynamic and morphological processes within complex estuary and coastal areas. It utilises a flexible mesh approach that can provide an efficient representation of complex geographical areas. However, at present it does not provide a function that would enable structures, such as piles, to be simulated within the mesh at structure scale. As developments within the coastal zone continue to encroach on the shallow coastal waters, there is an increasing need to be able to effectively determine the impact of these structures, whether they are surface piercing or contained within the water column, and their potential to cause localised effects on the hydrodynamic and morphological regime. In the past these types of structures have been accounted for within classic MIKE 21 using the 'pier resistance' option through a subgrid scaling technique. This method is based on the Morison's equation which uses a quadratic friction term that influences the horizontal flow distribution. The present study looks to use this theory to incorporate single pile structures into MIKE FM by converting the current induced drag force on each individual pile into a Manning number, M, which varies in the domain. The 'blocking effect' of the structures will be compared to results from a nested MIKE 21 model where the piles can be resolved at structure scale.