Challenges in wave force modelling for mooring design in high seas - DTU Orbit
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Line breakage events have been experienced on moored structures during recent years. These are often occurring in heavy weather and overload is one of the reasons pointed out. The present paper identifies possible physical phenomena that may lead to wave forces higher than predicted by state-of-the-art hydrodynamic tools and procedures, and thereby higher mooring line loads, in high and steep waves. In particular, a need to re-explore wave-group induced slowly varying, low-frequency (LF) drift forces has been identified. Both mobile offshore units (MODU’s) and permanently moored floaters are considered, semisubmersibles and FPSOs. Empirical corrections are sometimes being applied in design of mooring lines, while not ingeneral, and there is no established common industry practice on such corrections. More advanced tools and knowledge do exist in research communities, while they still need further development for robust engineering use. A brief overview is given of state-of-the-art methods and tools in modelling of the hydrodynamic forces on large-volume floaters, with particular focus on slowly varying wave forces. Full scale experiences from real sea events and from a variety of earlier case studies including model tests are reviewed. It is found that several items may be critical in the proper prediction of LF wave forces in high seas and combined current and should be investigated further, in particular:

- Wave-current interaction
- Viscous wave drift forces
- Large and nonlinear wave
- Frequency vessel motions.

Based upon these preliminary investigations, the paper gives recommendations for actions and further developments for improved predictions in industry practice.

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