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The Dynamic Motion of the OC4 Floating Turbine with Different Incident Wave and Wind Directions in a Mooring System Failure Condition in Numerical Model

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In this paper, the commercial software Orcaflex is used to simulate the motion behavior of the OC4 floating platform, and the floater stability and mooring line tension after the mooring system failure. In the time domain analysis, the discussion is divided into three phases—the first phase (before the tether failure), the second phase (before the tether failure, before reaching the new steady-state), and the third phase (after reaching the new steady-state). The motion characteristics and tension values at different stages were observed. In this study, only a 50-year return period wave condition is used as an input condition and simulating 11 different incident wind and wave directions. The numerical results are presented in the trajectory map and the table. About the tension of the mooring line, after the mooring system fails, it is notable that the mooring line tension will first decrease and then increase slightly above the initial tension value. In other words, the mooring system may survive after the failure of one mooring line and got a new balance of it. However, the tension amplitude will be higher than the first stage in the new balance and it will likely increase the risk of mooring line fatigue.