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Dynamic Responses of Flexible Cylinders with Low Mass Ratio ABIODUN OLAOYE, ZHICHENG WANG, MICHAEL TRIANTAFYLLOU, Massachusetts Inst of Tech-MIT — Flexible cylinders with low mass ratios such as composite risers are attractive in the offshore industry because they require lower top tension and are less likely to buckle under self-weight compared to steel risers. However, their relatively low stiffness characteristics make them more vulnerable to vortex induced vibrations. Additionally, numerical investigation of the dynamic responses of such structures based on realistic conditions is limited by high Reynolds number, complex sheared flow profile, large aspect ratio and low mass ratio challenges. In the framework of Fourier spectral/hp element method, the current technique employs entropy-viscosity method (EVM) based large-eddy simulation approach for flow solver and fictitious added mass method for structure solver. The combination of both methods can handle fluid-structure interaction problems at high Reynolds number with low mass ratio. A validation of the numerical approach is provided by comparison with experiments.

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