

The Effects of the Aspect Ratio of a Flexible Cylinder on the Vortex Dynamics

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Abstract : The vortex structures observed in the wake of a flexible cylinder can be significantly different from those of a traditional vibrating, spring mounted, rigid cylinder. These differences can significantly affect the VIV characteristics of the flow and subsequently the VIV response of the cylindrical structures. In this work, we present how the aspect ratio of a flexible cylinder can change the vortex structures in its wake. We will discuss different vortex dynamics which can be observed in the wake of the vibrating flexible cylinder, and how they can affect the vibrational response of the cylinder. Moreover, we will study the transition of these structures versus the aspect ratio of the flexible cylinder. We will discuss how these transitions affect the in-line and transverse forces on the structure. In the end, we will provide general guidelines on the minimum acceptable aspect ratio for the offshore riser studies which may have grave implications for future numerical and experimental works.

Keywords : aspect ratio, flexible cylinder, vortex-shedding, VIV

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