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Gain-Scheduled Control of a Flexible Marine Riser under Hydrodynamical Damping Force Varying with the Upper End Velocity

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Summary: In the entry/reentry operation of the flexible marine riser, the operators are required to connect its lower end to the blowout preventer at the seabed quickly with both its top connected angle and its deformation controlled. Because of the hydrodynamical force and the flexibility of the riser, it is very difficult for them to operate it correctly. In the paper, we consider the entry/reentry control problem of the flexible marine riser. Firstly, the governing equation of the flexible marine riser is formulated and transformed to the finite dimensional equation by the mode expansion method. Secondly, for the control problem, we apply LPV (Linear Parameter Varying) technique taking the varying parameter as its upper end velocity which determines the hydrodynamical damping force. Finally, the effectiveness of the LPV technique is shown by numerical simulations, compared with the results by the LTI (Linear Time Invariant) H_{∞} control

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