

## **A discussion on the state of drillstring vibrations control: Industry vs Research**

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The process of drilling for hydrocarbon extraction and geothermal applications involves creating a borehole in the earth by crushing through the rock formations to access the energy source. Vibrations and shocks are drilling dynamic phenomenon that are unavoidable and are detrimental to the equipment and pose a threat to rig safety. Understanding the drillstring vibration is the essential first step to control/mitigate the harmful vibrations and for this reason different modeling techniques have been used to model the drillstring vibrations. Lumped parameter models, distributed parameter models, neutral-type time delay models and coupled PDE-ODE models are some of the modeling methods used to model the drillstring dynamics. These models once derived are further used to design control algorithms to help cure drillstring vibrations. Although in literature several drillstring models have been formulated and a number of controllers have been designed, they have not been standardized and applied to the field. The industry to this date mostly uses a stiff PI controller or a SoftTorque system to control vibration, both of which are over two decade old techniques. This paper discusses the state of drillstring vibration control, controllers that have been proposed in the recent years and why they still haven't made it to the field. A hybrid approach involving the integration of system modeling, experimental investigation and machine learning has been proposed to aid in design of robust and practical controller.