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(54) Title: GENERALIZED MODAL SPACE DRIVE CONTROL SYSTEM FOR A VIBRATING TUBE PROCESS PARAMETER SENSOR

(57) Abstract

A drive system is taught for controlling the modal content of any number of drive signals used to excite any number of drives on a vibrating conduit such as is found in a Coriolis mass flowmeter or a vibrating tube densimeter. One or more motion signals are obtained from one or more spatially distinct feedback sensors. The motion signals are preferably filtered using a multi-channel modal filter to decompose the motion signals, each of which contain modal content at a plurality of vibration modes, into n single degree of freedom modal response signals. Each modal response signal corresponds to one of the vibration modes at which the vibrating conduit is excited. The n modal response signals are input to a drive channel having a separate processing channel for each of the n modal response signals. Within each drive controller channel, the respective modal response signal is compared to a desired modal response setpoint and the resulting mode error signal is amplified by a modal gain to produce a modal excitation signal for each mode. The modal excitation signal represents the modal excitation necessarily applied to the vibrating conduit to cause the modal response to match the modal setpoint for the given mode. The modal excitation signals are transformed from the modal domain back to the physical domain and mapped to the physical locations of the drives. The resulting drive signals are applied to the drives to excite the conduit.

