How to Tune Your Gyro

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Abstract:

MEM vibratory gyros that achieve sub-degree-per-hour bias instability, and low angle random walk, typically exploit frequency matching of a pair of coriolis-coupled modes within the resonant structure. High quality factors are desired in order to boost the signal-to-noise ratio but this places stringent bounds on the degree of modal frequency detuning that can be tolerated. Traditionally, electrostatic biasing has been employed for modal frequency matching, however, any drift in the electrostatic biases will be reflected as a change in sensor dynamics that will subsequently produce drift in the zero rate signals. After an overview of how various noise sources contribute to the spectrum of the measured angular rate, and under what circumstances it is important to frequency match the modes, I will introduce recent advances in the art of modifying MEM gyro dynamics via mass perturbation that accomplishes frequency matching without the need for electrostatic biasing schemes.

Bio:

Robert M'Closkey received his PhD in 1995 from the Department of Mechanical Engineering, California Institute of Technology. He joined the Mechanical and Aerospace Engineering Department at UCLA after a half-year visiting position at UC Berkeley. He received the NSF Career Award in 1999 and has several teaching awards from UCLA's School of Engineering.