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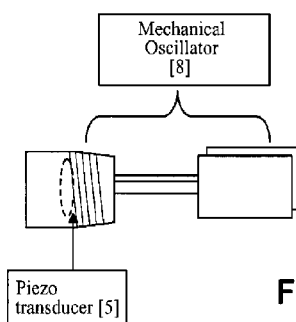
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(54) Title: DETERMINING THE RESONANCE PARAMETERS FOR MECHANICAL OSCILLATORS

Mechanical Oscillator with Piezo-Electric Transducer

**FIG. 1**

(57) **Abstract:** The prior art describes the application of mechanical oscillators for the measurement of corrosion and/or deposition. Mechanical oscillators employ the use of resonance parameters, frequency and the quality factor Q , for the measurement of corrosion or deposition. However, the prior art does not consider the required precision for measuring frequency or Q in the presence of noise to make these measurements. In particular, the ability of the mechanical oscillator to measure small amounts of metal loss or deposition is not only dependent upon the mechanical design but is limited by the precision in determining the resonance frequency and Q . The present invention discloses methods for measuring these resonance parameters with a high precision in the presence of noise. This degree of precision is required to maximize the utility of these devices as sensitive probes for corrosion and deposition (fouling) measurement. All of the embodiments described herein employ curve fitting consistent with modeling the mechanical oscillator as a simple harmonic oscillator. This curve fitting procedure, combined with averaging and utilizing signal processing parameters to mitigate noise effects, adds considerable precision in measuring resonance parameters.