ON MASS SENSING USING MICRO/NANO RESONATORS - APPROACHES, CHALLENGES AND DIRECTIONS

Bhaskar Choubey[1] and Alistair McEwan[2]

[1]Department of Engineering Science

University of Oxford, Oxford, UK

Email: bhaskar.choubey@eng.ox.ac.uk

[2]School of Electrical and Information Engineering

The University of Sydney, Sydney

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Abstract- ***Micro/Nano electromechanical systems based Mass sensors are being increasingly used for detecting very low masses, with significant applications in bio-sensing as well as environmental sensing. A number of different shapes, excitation mechanisms as well as materials have been suggested for these sensors. In addition, with reducing dimensions due to improvement in fabrication, these sensors have the potential to measure bacterial level masses. This paper reviews some of the research directions in this field. Various sensing and actuation strategies for these resonators are discussed. In addition, three important challenges, which have the potential of providing new directions of research are also explored. These include quality factor, increasing nonlinearity and coupling. Coupling of sensors can provide a unique opportunity to build several resonant sensors on the same chip and reduce the number of contacts required as well as the potential bandwidth***

Index Words - Microelectromechanical systems, Mass sensors, damping, nonlinearity, coupled systems