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**Influence of a resonance changer on the sound radiation of a submarine**

Sascha Merz<sup>a</sup>, Roger Kinns<sup>a</sup> and Nicole Kessissoglou<sup>b</sup>

<sup>a</sup>University of New South Wales, School of Mechanical and Manufacturing Engineering, 2052 Kensington, Australia

<sup>b</sup>University of New South Wales, 2052 Sydney, Australia

In order to reduce the excitation of the submarine hull through the shaft, a vibration attenuation system, called a resonance changer, can be implemented in the propeller/propulsion system. The effectiveness of such a system in reducing the low frequency sound radiation characteristics of a submarine is investigated. Only sound radiation due to fluctuating propeller forces, which are generated by the operation of the propeller in a non-uniform wake, is considered. These fluctuating forces are transmitted to the submarine hull through the fluid, as well as through the propeller shaft. Both types of excitation cause hull vibration and sound radiation. The accordion modes of the pressure hull, are particularly efficient sound radiators.

Parameters for the resonance changer system have been optimised previously by considering only excitation of the hull through the shaft. It is shown that the effectiveness of the resonance changer at different frequencies is modified significantly in a typical full-scale implementation, due to the sound radiation from the propeller. The effect on performance is increased further when the vibration of the propeller itself is taken into account. Therefore overall optimisation of any resonance changer system requires a comprehensive model. Some of the principal effects are explored in this paper.