

Vibroacoustic Characteristics of a Utility Terrain Vehicle. Part II: Acoustic Analysis

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This paper presents vibroacoustic analyses of a full-size Utility Terrain Vehicle (UTV) by using the HELS (Helmholtz Equation Least Squares) method through visualization of three-dimensional (3D) complex vibration patterns including the resonance modes and the corresponding acoustic field. The main advantages of using the HELS method rather than measurement-based approach include but not limited to: 1) obtain a holistic view of the vibroacoustic characteristics by taking a relatively fewer measurement points; 2) determine the vibroacoustic characteristics over an entire surface of interest rather than the locations on which measurements are taken; and 3) facilitate the correlations between structural vibrations and acoustic radiation so as to identify the critical components of the structural vibrations that are responsible for acoustic radiation. Part II is focused on the analyses of the noise issues generated by the engine and muffler as well as correlations between the structural vibrations and acoustic radiation. Moreover, the root causes of the major structural vibrations and acoustic radiation are determined and the corresponding mitigation strategies are discussed.