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DESIGN OPTIMIZATION OF COVER PANEL OF ENGINE-INCLUDED SYSTEM USING TOPOGRAPHY OPTIMIZATION

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Abstract: As the power usage of the home appliances gradually increases, research on a high-efficient mechanical system has been focused. In order to develop a high-efficient system with high performance, a gas engine was used as a power source. The engine-included system has much higher energy efficiency than a conventional system powered by the electromagnetic motor. However, if the gas engine was adopted as a power source, the energy efficiency and power of the system are improved while the radiation noise is increased. To overcome this drawback, we design a shell structure including optimal bead pattern that reduces the sound radiation using the topography optimization to the cover panel of the system. In this study, the vibration behavior of the system was measured with the engine speed sweep. Using this result, the target frequency band is determined. In this research, the objective function is an equivalent radiated power (ERP), which is the radiation power calculated from only the structural velocity. In addition, a shell structure with bead pattern is designed to minimize the equivalent radiated power in a given target frequency band using topography optimization. The shape change of the panel bring the change of stiffness. Finally, equivalent radiated power is also changed. Using the topography optimization, the optimal bead pattern on the panel to minimize the equivalent radiated power could found.

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