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Reinforcement of an Electric Vehicle Battery Pack Using Honeycomb Structures

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Abstract : As more battery electric vehicles are being introduced into the automobile industry, continuous advancements are constantly made in the electric vehicle space. Improvements in lithium-ion battery technology allow electric vehicles to be capable of traveling long distances. The batteries are capable of being charged faster, allowing for a sufficient range in shorter amounts of time. With increased reliance on battery technology and the changes in vehicle power trains, new challenges arise from this. Resulting electric vehicle fires caused by collisions are potentially more dangerous than those of the typical internal combustion engine. To further reduce the battery failures involved with side collisions, this project intends to reinforce an existing battery pack of an electric vehicle with honeycomb structures such that intrusion into the batteries can be minimized with weight restrictions in place. Honeycomb structures of hexagonal geometry are implemented into the side extrusions of the battery pack. With the use of explicit dynamics simulations performed in ANSYS, quantitative results such as deformation, strain, and stress are used to compare the performance of the battery pack with and without the implemented honeycomb structures.

Keywords : battery pack, electric vehicle, honeycomb, side impact
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