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# Dynamic impact response of aluminum honeycombs filled with Expanded Polypropylene foam

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## Abstract

The paper investigated the dynamic impact response and characteristics of aluminum honeycomb filled with EPP foam (Expanded polypropylene) experimentally and numerically. It was found that the initial peak strength and mean strength of the filled honeycomb were improved significantly attributable to the interaction effect between the aluminum honeycomb and the foam, but the specific energy absorption (*SEA*) decreased. For the filled specimens with the same foam density, the initial peak strength, mean strength and *SEA* increased with the increase in impact velocity. Compared with the characteristics in the static compression test, the initial peak strength in the dynamic impact test increased, whereas the mean strength and *SEA* decreased. The study showed that EPP foam filling was effective to improve the impact characteristics of the bare aluminum honeycomb. Numerical simulation for the dynamic impact of filled honeycombs was also explored. It accurately reproduced the deformation process and addressed the interaction between the wall and EPP foam. By comparison of the properties in different filling types, it showed the single-cell filling was a good choice to improve the load resistance while using the least filling material.

**Keywords:** Foam-filling; Honeycomb; EPP foam; Dynamic Impact

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