

HONEYCOMBS: CELLULAR MATERIALS OR PERIODIC STRUCTURES?

SPEAKER: **KAITLYNN CONWAY**

Cellular materials and periodic structures are often used interchangeably in literature in regards to honeycombs and other repeating geometries. However, a material and a structure have different characteristics from a mechanical standpoint. A material's mechanical properties do not change as the amount of material changes. The mechanical properties of a structure however, may change as the structure is scaled up or down. This presentation will explore the mechanical behaviors of additively manufactured honeycombs made of ABS and PLA to investigate whether the printed honeycombs should be considered a cellular material or a periodic structure. Honeycomb specimen of different cell numbers, cell orientation, wall thickness and height are tested to compare how changes effect the behavior of the honeycomb. The honeycomb specimens were tested in tension at a constant strain rate. The stress-strain curve, Young's Modulus and Ultimate Tensile Strength were used to compare the global behavior of different honeycombs. Digital imaging correlation (DIC) was used to observe local behaviors such as local strains within the honeycomb, the formation of hinges at the intersection of walls within the honeycombs, and the appearance of crazing before failure of the specimen.

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