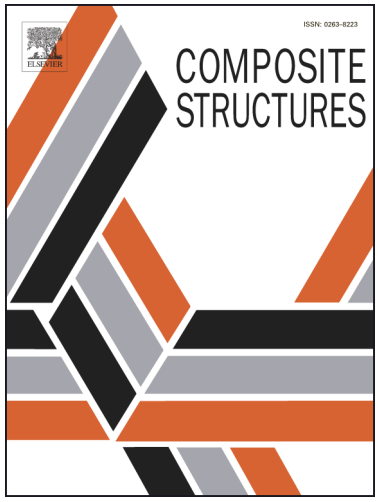

Crushing and energy absorption of density-graded foam-filled square columns: experimental and theoretical investigations

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PII: S0263-8223(18)31622-2
DOI: https://doi.org/10.1016/j.compstruct.2018.06.053
Reference: COST 9847

To appear in: *Composite Structures*

Received Date: 4 May 2018
Revised Date: 9 June 2018
Accepted Date: 15 June 2018

Please cite this article as: Yu, X., Qin, Q., Zhang, J., He, S., Xiang, C., Wang, M., Wang, T.J., Crushing and energy absorption of density-graded foam-filled square columns: experimental and theoretical investigations, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.06.053

Crushing and energy absorption of density-graded foam-filled square columns: experimental and theoretical investigations

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Abstract: The static axial crushing and energy absorption of density-graded aluminum foam-filled square metal columns are experimentally and theoretically investigated. Typical deformation modes are observed in experiments, such as symmetric, asymmetric, extension and rupture modes. Theoretical analysis is carried out and the predictions are in good agreement with the experimental results. The effects of gradient pattern, density difference, average density of foam, and wall thickness on the crushing of foam-filled columns are discussed. It is shown that the density-graded aluminum foam-filled square metal column is a novel topological structure with higher energy absorption, higher load-carrying capacity and much higher crushing force efficiency.

Keywords: Density-graded aluminum foam; Square column; Axial compression; Crushing; Energy absorption.

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