

Mixed auxeticity of auxetic sandwich structures

T.-Ch. Lim

*School of Science & Technology, SIM University
461 Clementi Road, S 599491, Singapore*

A sandwich structure in which the Poisson's ratios of the core and facesheets have opposite signs has been shown to exhibit overall conventional or auxetic behavior depending on the loading mode – axial loading or bending – for an intermediate range of relative core thicknesses [1]. In addition to these two loading modes, sandwich structures used in aerospace applications are subject to torsional loading. In this presentation, an effective Poisson's ratio for torsional loading is proposed. Results show that, depending on the loading mode and the relative core thickness, there can be up to four levels of auxeticity, namely (a) full auxeticity (FA), if the structure behaves as an auxetic under all three modes of loading; (b) high auxeticity (HA), if the structure behaves as an auxetic in two of the loading modes; (c) low auxeticity (LA), if the structure behaves as an auxetic structure in only one of the loading modes; and (d) no auxeticity (NA), if the structure behaves conventionally under all three modes of loading. These results suggest that by properly selecting the Poisson's ratios and the thickness of the cores and facesheets, the sandwich structure can be tuned to respond differently under different external loading conditions.

References

- [1] T. C. Lim, *Physica Status Solidi B* **244**, 910–918 (2007)