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&

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Vincent Tan

*National University of Singapore, Singapore***Bio-inspired composites**

Comprising layers of aligned chitin filaments stacked together, the exoskeletons of many crustaceans are analogous to fibre reinforced composites. A unique feature of crustacean laminates is their helicoidal lay-up. Each layer is rotated a slight angle from the layer below like the steps of a spiral staircase – an unusual configuration that is never considered for structural composites. Carbon fibre reinforced epoxy with helicoidal lay-ups were fabricated and tested to determine if they offered any advantage. Under transverse loads, helicoidal laminates outperformed commonly used cross-ply and quasi-isotropic laminates in terms of peak load by up to 50%. Reasons for the improved performance are suggested and validated by further tests involving other composite material systems. Based on

these investigations, ideas for helicoidal laminates that can be healed after sustaining damage will be presented.

Biography

Vincent Tan is an Associate Professor and Deputy Head at the Department of Mechanical Engineering, National University of Singapore. His current research projects cover multiscale modeling of heterogeneous materials, damage in composite materials and structures and ballistics. His research on concurrent multiscale methods and bioinspired composites have been presented in several invited seminars. He is currently a member of the General Council of the International Association for Computational Mechanics and Vice President and Fellow of the Association for Computational Mechanics, Singapore.

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