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Bio-inspired protective structures for marine applications

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Materials and structures for marine applications often require to combine high mechanical performance with lightness. Sandwich structures based on polymeric or metallic cores are traditional lightweight solutions for marine applications. However, common sandwich structures do not always offer a suitable protection from some ordinary in-service events such as low-velocity impacts with floating and submerged objects or with docks. The design of more efficient lightweight protective systems for marine applications, may take inspiration from nature, which developed incredible solutions throughout millions of years of evolution. In the current work, bamboo structure was studied and subjected to mechanical tests. The results of the analysis allowed the identification of some structural characteristics which make the investigated materials efficient in impact absorption. Consequently, some bio-inspired designs were suggested with the aim of improving low-velocity impact resistance of some marine structures, providing good structural performance and lightweight properties.

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