综述评论

生物结构自适应性的力学研究及其应用

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摘要　　以生物的骨组织、竹子以及植物根系、动物血管等生物分枝系统为例，从微观组织结构和宏观形态，以力学的观点，对生物形态组织结构的自适应性进行了分析研究，并概括地介绍了这种自适应性在工程材料及工程结构设计中的应用，如基于骨组织重建机理的自修复材料、基于生物分枝系统形态生成机理的薄板加强筋以及热传递系统中散热通道的分布设计等. 模拟生物结构和系统的工程材料和结构及其设计方法，因具有与生物结构和系统相似的优越性能，可突破传统产品和设计方法的一些局限性. 基于仿生技术的生物形态、材料与机能、强度等关系的进一步研究，以及相关的理想工程材料和结构的设计与制造方法的研究，将是当前和未来十分重要的研究课题.

关键词　　仿生设计, 生物形态和结构　自适应性,工程材料,工程结构

分类号

A MECHANICS STUDY ON ADAPTIVENESS OF BIOLOGIC MORPHOLOGIES AND STRUCTURE AND ITS APPLICATIONS

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Abstract

  By means of the microstructures and morphologies of bone, bamboo and biologic branch systems in nature, the adaptiveness of the biologic morphologies and structures is studied from the viewpoint of mechanics. Some engineering applications are briefly introduced, such as self-healing materials on the basis of the re-construction mechanism of bone, design methodologies of stiffener distribution for thin plate structures and cooling channel layout in the heat transfer systems on the basis of the growth mechanism of the biologic branch systems. The engineering materials and structures as well as their design methodologies based on the growth mechanisms of the living things in nature can break through some limits of the conventional products and methods. It can be said that the study on the relationship between the morphologies and materials of living things, and their functional performance and strengths, as well as the ideal engineering materials and structural design methodologies, is a very important research topic.

Key words　bionic design　biologic morphology and structure　adaptiveness　engineering material and structures

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