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用截面变形耦合有限元法分析复合材料梁

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摘要: 复合材料板和梁具有优良的特性, 从而获得了广泛的应用. 然而由于材料的各向异性, 使得对这类材料构件作变形和应力分析时, 即使应用如有限元法的数值分析手段仍是非常复杂费时的. 为此提出了一个可应用常规有限单元法, 分析等截面复合材料梁承受均匀拉弯扭载荷的一个简单精确分析的实施方案. 由于巧妙地利用了变形的对称特性, 使得分析只需建立在梁的一个切片构造的几何模型上, 用常规三维实体有限单元进行结构离散. 推导了精确的变形场模式, 并借助结构平移自由度的耦合关系使得数值分析易于实施. 并通过数值算例来阐明方法的实施过程.

关键词: 复合材料; 等截面梁; 耦合方程; 有限单元法; 拉伸; 弯曲; 扭转

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