技术及应用

ITER校正场线圈等效材料属性有限元分析

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摘要　　校正场线圈是ITER大型超导磁体系统的重要组成部分，其线圈体由多种材料组成且周期性排列，对其等效材料属性预测很重要。目前主要采用基于均匀化理论的有限元方法，但其处理过程复杂。本文提出了基于广义虎克定律的有限元方法，使求解过程更简便。分析对比两种方法，后一种方法处理过程更简单，结果更精确，所得结果为校正场线圈的结构分析和热分析提供了必要的参数。

关键词　　ITER　校正场线圈　复合材料　等效材料属性　有限元方法

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Finite Element Analysis of Equivalent Material Properties of ITER Correction Coils

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Abstract Correction coils (CC) are the important components of International Thermonuclear Experimental Reactor (ITER) superconducting systems. The coil body is composed of many types of material and periodic micro-structure. It is important to predict its equivalent material properties. A method commonly used is finite element method (FEM) based on homogenization theory, whose process is complicated. A new FEM based on Generalized Hook's Law was proposed. Compared two methods with each other, it is found that the latter is easier and more precise. The results provide essential parameters for structure analysis and thermal analysis for CC.

Key words International Thermonuclear Experimental Reactor _ correction coils _
composite material _ equivalent material property _ finite element method

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