原子能科学技术 2010 44 (6): 740-744 ISSN: 1000-6931 CN: 11-2044/TL

技术及应用

脉冲磁体中电磁与温度场耦合的有限元分析

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收稿日期 修回日期 网络版发布日期:

摘要 脉冲强磁体处于复杂的电磁、热、应力等多物理场共同作用下，设计中考虑的因素众多，物理关系复杂，分析过程繁琐。借助大型有限元软件分析工具ANSYS建立了70 T脉冲强磁体中电磁、温度场耦合分析模型，实现了磁场与温度场的计算，并通过有限元方法实现了脉冲磁体性能的优化。实验结果表明，磁体样机达到70 T磁场水平。

关键词 脉冲磁体 强磁场 ANSYS 耦合场

分类号

Analysis of Electromagnetic Thermal Coupled Field in Pulsed Magnet With Finite Element Method

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Abstract Pulsed magnet bears the effect of electro-magnetic, thermal and structural fields. During the design procedure, lots of factors have to be taken into account, which makes the analysis extremely complicated. The model of the coupled magnetic and thermal analysis in a 70 T prototype pulsed magnet was established with commercial finite element analysis software ANSYS. The magnetic field and temperature distribution were calculated. Based on the analysis, the performance of the pulsed magnet was optimized. Experimental results show that 70 T magnetic field is achieved with the pulsed magnet.

Key words pulsed magnet _ high magnetic field _ ANSYS _ coupled field

DOI

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