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铍环电子束焊接温度场和应力场的有限元分析

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摘要 采用ADINA/ADINAT对铍环电子束焊接过程的温度场和应力场进行了有限元分析 ,结果表明 :铍环焊接过程中焊缝外表面最高温度达 2 73 4℃ ,内表面最高温度仅 3 78℃ ,位于外止口铍钚一侧 ;铍环电子束焊接后 ,在焊缝附近 2 0mm范围内焊接残余应力较大 ,焊缝处于复杂的三维应力状态 ,焊缝根部的残余应力达到最大 ;内外止口铍环由于结构差异 ,焊接残余应力分布并不完全相同。

关键词 铍 电子束焊接 温度场 应力场 有限元分析

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Prediction of Temperature and Stress Fields in Beryllium Ring During Electron Beam Welding by Finite Element Analysis

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Abstract The temperature and stress fields in beryllium ring are analyzed by ADINA/ADINAT software during electron beam welding.The result shows that the highest temperature at the outer surface reaches 2 734 ℃, while the highest temperature at the inner surface is only 378 ℃, which is located at the side of out opening of beryllium ring. After welding, residual stress is considerable large and complexity within 2.0 mm from the weld line and residual stress reaches the largest at the weld toe. For the structure difference between in opening and out opening beryllium ring, residual stress at the in opening beryllium ring is not as same as that at the out opening beryllium ring.

Key words beryllium electron beam welding temperature field stress field finite element analysis

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