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圆管孔边角裂纹剪切型应力强度因子的封闭解

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A CLOSED FORM SOLUTION OF STRESS INTENSITY FACTORS OF SHEAR MODE FOR A CIRCULAR TUBE WITH HOLE EDGE CORNER CRACKS

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摘要

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摘要 在飞机全动平尾大轴中,经常出现孔边角裂纹。本文提出了一种新的工程-解析方法,导出了飞机平尾大轴孔边角裂纹剪切型应力强度因子的封闭解。这种能量释放方法非常节省机时与人力,可以获得大量系统的新结果。

关键词: 剪切型应力强度因子 飞机平尾大轴 孔边角裂纹 能量释放率

Abstract: A closed form solution of stress intensity factors of shear mode for a circular tube with non-throughthickness hole edge cracks is derived by means of the energy release rate method. This method is used to formulate a classical Bernoulli's differential equation about the amplitude of crack sliding displacements with respect to the parameter of virtual crack extension. This equation has closed form solution and the integration can be carried out by variable separation. The stress intensity factors KII and KIII are determined by the amplitude of crack sliding displacements. The mode of crack sliding displacements are given by the two dimensional assumptions of radial and circumferential slices of the circular tube. This closed form solution of energy release rate method is very time-saving and a complete series of useful results can be obtained. The results are degenerated to the cases of flat plates and fit very well with those given by alternating method.

Keywords: stress intensity factors of shear modes tube hole edge corner crack energy release rate method closed form solution

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