



## 轴对称功能梯度圆板稳态热传导的精确解

### Exact Solution of Steady-state Heat Conduction for Axisymmetric Functionally Graded Circular Plate

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英文关键词: [functionally graded circular plate](#) [steady-state heat conduction](#) [variable separation method](#) [exact solution](#)

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#### 中文摘要

对轴对称功能梯度圆板稳态热传导问题进行精确分析。根据正交各向异性功能梯度圆板稳态热传导的基本方程, 假设材料热导率沿板厚方向按指数函数形式梯度分布, 利用分离变量法, 获得了在上下表面作用任意热载荷情况下的精确解。通过数值算例, 分析了材料性质的梯度变化和板厚对温度场分布的影响。所获得的精确结果, 可以作为评价其它近似方法的标准解答。

#### 英文摘要

An exact analysis of steady-state heat conduction was presented for the axisymmetric functionally graded circular plate. Based on the basic equation of heat conduction of an orthotropic functionally graded circular plate, assuming that the heat conductivity has the exponential dependence on the plate-thickness direction, an exact solution was obtained for the axisymmetric functionally graded circular plate subjected to arbitrary thermal loads on its upper and lower surfaces by means of variable separation method. With the variation of material graded distributions and plate-thickness, the influence of the temperature field distributions of the circular plate was studied through a numerical example. The obtained exact solution could serve as a benchmark result to assess other approximate methodologies.

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