

反应堆工程

模拟燃料棒通电加热的可视化实验研究

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摘要 长直棒束是一种结构简单的电加热模拟燃料棒组件。在通电条件下, 各单棒间将产生一定的相吸相斥效应。为保证这种加热组件使用的安全性, 本实验利用高速摄像机对由9棒束中各棒通电加热后产生的相吸相斥现象进行研究。可视化实验研究结果表明, 棒束通入直流电压后将产生一定程度的偏移。通过高速摄像机的逐帧播放, 观察到当通电电压增加到85 V、通电电流为450 A时, 棒与棒间最大偏移距离约为1 mm, 且各单棒在通入直流电后的相吸相斥效应随直流电流的大小和通电方向变化而变化。棒束通入交流电后也产生相吸相斥效应, 但其产生的效果没有通入直流电后产生的明显。

关键词 [模拟燃料棒](#) [通电加热](#) [相吸相斥效应](#)

分类号

Experimental Visualization of Simulated Fuel Rods With Electric Heating

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Abstract Long straight rod bundles are electric-heating-simulated fuel assembly with primary structure. When electric circuit is exerted on rods, attraction and repulsion effects are generated in rod bundles. To ensure use feasibility of simulated fuel rods, experimental research on attraction and repulsion effects on electric heating 9 rod bundles was carried out with high-speed camera in detail. Visual experimental results show that rod offset occurs when imposing DC electric fields on rod bundles. As electric voltage is 85 V and electric current is up to 450 A, the maximum offset of rod bundles is approximately 1 mm. The magnitude and direction of rod bundles to offset change when DC electric current shifts. AC electric current also exerts influence on attraction and repulsion of rod bundles, less significant than that of DC electric current.

Key words

[simulated](#) [fuel](#) [rods](#) [electric](#) [heating](#) [attraction](#) [and](#) [repulsion](#) [effects](#)

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