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## 中国先进研究堆冷中子源冷包含气率及两相热虹吸循环模拟试验研究

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**摘要** 以氟利昂R113为工质对中国先进研究堆(CARR)冷中子源(CNS)两相氢热虹吸循环回路进行了全尺寸模拟试验。以气液密度比、体积蒸发率相等为相似准则,试验研究了循环特性、冷包液位、截面含气率与热负荷的关系。实验观测到,各工况下的模拟回路均能建立稳定的循环,在冷包内形成了内筒含气、环形空间充满一定含气率的气液两相混合物的慢化剂结构。随热负荷变化,模拟系统冷包液位具有自调节性。

**关键词** [中国先进研究堆](#) [冷中子源](#) [含气率](#) [两相热虹吸循环](#) [自调节性](#) [冷包](#) [模拟试验](#)

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## Mockup Tests of Void Fraction in Moderator Cell and Two-phase Thermosiphon Loop of Cold Neutron Source in China Advanced Research Reactor

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**Abstract** Full-scale mockup tests were carried out using freon-113 as a working fluid to verify the design of China Advanced Research Reactor (CARR) Cold Neutron Source (CNS), which is a two-phase hydrogen thermosiphon loop consisting of an annular cylindrical moderator cell, two separated hydrogen transfer tubes and a condenser. The circulation characteristics, liquid level and void fraction in the moderator cell against the variation of the heat load were studied. The density ratio and the volumetric evaporating rate of the mockup test are kept the same as those of CARR CNS. The test results show that the mockup loop can establish stable circulation and has a self-regulating characteristic. Within the moderator cell, the inner shell contains only vapor and the outer shell contains the mixture of vapor-liquid with void fraction in a certain range.

**Key words** [China Advanced Research Reactor](#) [cold neutron source](#) [void fraction](#) [two phase thermosiphon loop](#) [self-regulation](#) [annular cylindrical type moderator cell](#) [mockup test](#)

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