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秦山核电站考验元件燃耗的辐照史校正计算

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摘要 通过实验测得反应堆停堆时刻裂变产物~(137)CS、~(148)Nd等监测体的浓度值,进而推算出辐照燃料元件的燃耗值是通常采用的方法。它需要若干参数,如裂变产物的平均裂变产额,反应(n,γ)的修正量,放射性裂变产物的堆内衰变修正量,可裂变核素的平均裂变能量等。这些参数都同燃料的辐照历史紧密关联。本文概述了上述参数的计算方法并给出了计算结果。方法的主要特点是:1.以考验元件的实际参数为输入数据;2.根据反应堆实际运行史反复循环模拟计算;3.除计算重核素及所要求的裂变产物的原子浓度和放射性外,仔细计算了~(137)Cs和~(148)Nd等核素(n—1)衰变链中子俘获反应的修正量。

关键词 燃料元件 燃耗 核电厂 辐照史校正

分类号

IRRADIATION HISTORY CORRECTION FOR BURNUP DETERMINATION OF TESTED FUEL ELEMENT OF QINSHAN NUCLEAR POWER PLANT

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Abstract Usually, concentration of fission product monitors ~(137)Cs and ~(148)Nd are measured experimentally, from which burnup of irradiation fuel element can be derived. The method needs several parameters, such as average fission yields of fission products, correction for reaction (n, γ), decay correction for radlioactive fission products in reactor, average fission energies of fissionable nuclides and so on. These parameters are strongly effected by irradiation history. The brief description of calculation method of above parameters and the results obtained are given. Main features of the method are follows: 1. Real parameters on fuel element as input data; 2. Calculation according to practical operation history of the reactor; 3. Besides atomic concentrations and radioactivities of desired heavy nuclides and fission products, calculations of neutron capture reaction of (n—1) decay chain of ~(137)Cs, ~(148)Nd are performed.

Key words Fuel elementBurnupNuclear power plantIrradiation history correction

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