

DETERMINATION OF AVERAGE NEUTRON FLUX IN A FUEL ELEMENT OF THE NUCLEAR REACTOR RP-10

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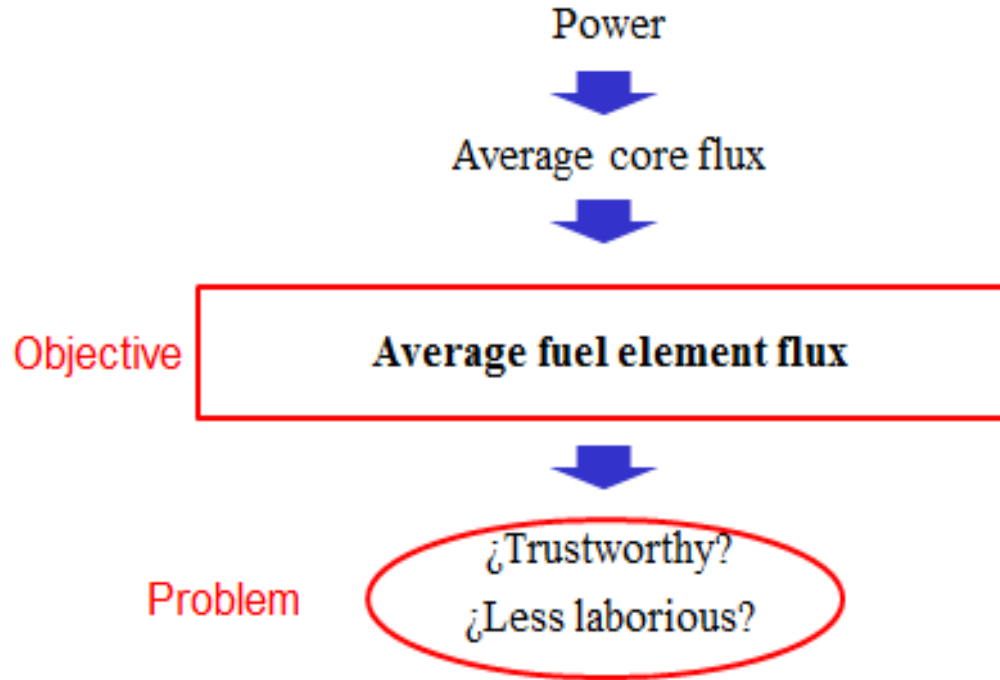
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Introduction



Method

To compare the size of work that would be done with the classical method (activation) and the hybrid, we consider the nuclear configuration N°46 of the RP10 nuclear reactor. It has 9 normal and 5 control fuel elements, in the first there are 15 channels and in the second there are 13. (Figure N°1). In the figure N°2 shows sample holders.

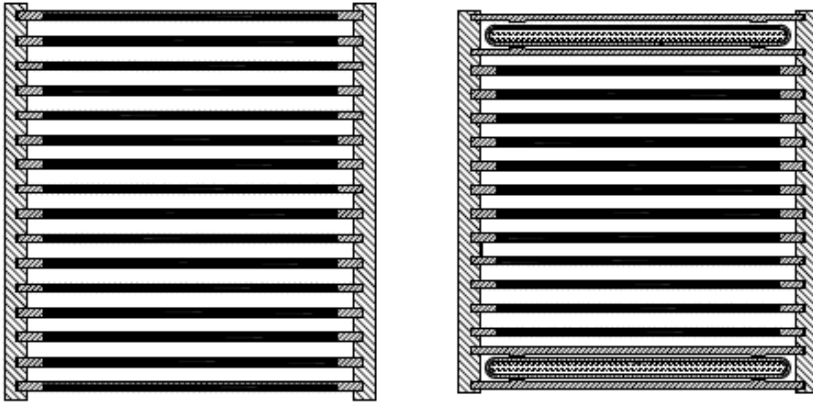


Fig.1 Normal and control fuel elements of the RP-10



Fig.2 Sample holders that are inserted into the channels, gold dics and cover cadmium

Method

In the figure N°3 shows the two measurements system.

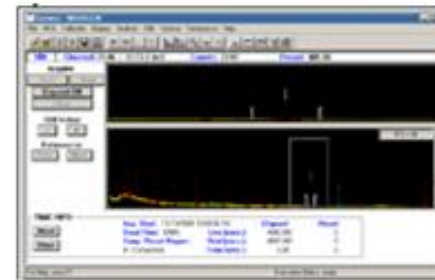
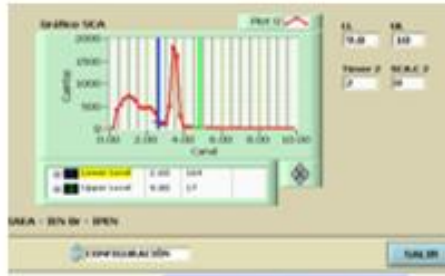
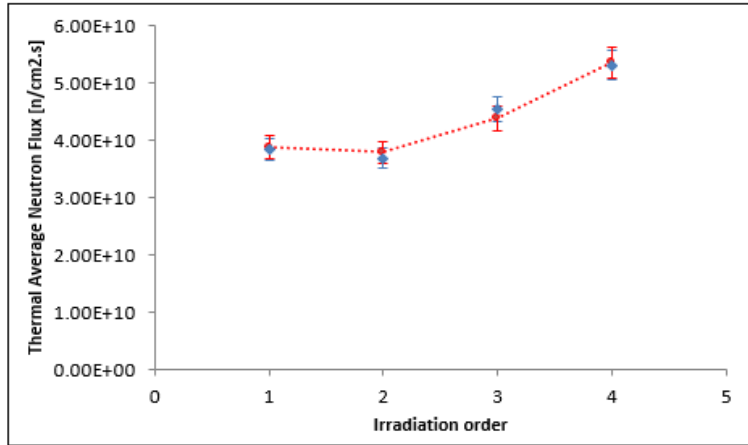


Fig.3 Measurements system. System based in Ina detector (Left). System based in Ge-hp detector (Rigth)

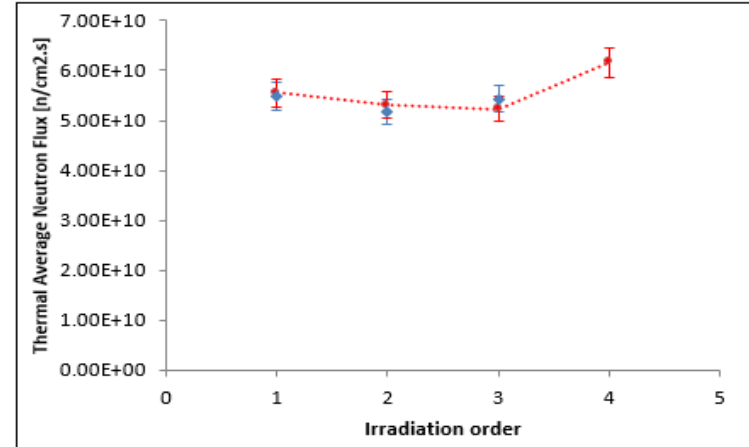
Result

Comparison of axial average thermal flux, measured and calculated in the fuel element channels F2 and C4.

THERMAL AVERAGE NEUTRON FLUX IN A FUEL ELEMENT F2 (AXIS Z)



THERMAL AVERAGE NEUTRON FLUX IN A FUEL ELEMENT E6 (AXIS Z)



Conclusion

- At the operating current 2.10×10^{-09} A, the maximum experimental mean neutron flux was located at E6 and its value was $5,36 \cdot 10^{+10}$ n/cm².
- The mean maximum neutron flux by calculation was located at E6 and C4. Its value was $5,37 \cdot 10^{+10}$ n/cm².
- The relative error of both result does not exceed 5%

POSITION	THERMAL NEUTRON FLUX EXP. BY ELEMENT (MEAT) [$\text{n}/\text{cm}^2 \cdot \text{s}$]	THERMAL NEUTRON FLUX CAL. (MEAT) BY ELEMENT [$\text{n}/\text{cm}^2 \cdot \text{s}$]	RELATIVE ERROR [%]
F2	4.35E+10	4.36E+10	0.25
C4	5.12E+10	5.37E+10	5.00
E6	5.36E+10	5.37E+10	0.11

