

The GENEPI-MASURCA coupling for the neutronic investigations of subcritical multiplying media in presence of an external neutron source :

The MUSE experiments

R. Soule¹, G. Granget¹, J.P. Chauvin¹, P. Thomas¹, J.F. Lebrat¹, M. Martini¹, W. Assal¹, P. Chaussonnet¹, J.M. Laurens¹, C.A. Bompas¹, J. Taxy¹, M. Salvatores¹

J. L. Belmont², A. Billebaud², R. Brissof², S. David², A. Giorn², D. Heuer², J.M. Loiseaux², O. Méplan², H. Nifenecker², J.B. Viano², J.F. Cavaignac², J.P. Longequeue²

J. Vergnes³, P. Barbrault³

D. Verrier⁴, B. Carluéc⁴

ABSTRACT

Accelerator Driven Systems (ADS) are being explored in France in the frame of the research program on radioactive waste management options. Besides studies aimed to clarify the motivations for ADS, a significant program has been started to validate experimentally the main physics principles of these systems. This program was initiated at CEA Cadarache in 1995, with the sponsorship of EdF and Framatome. Since 1997, the CNRS has joined the program, which is now a common CEA-CNRS-EdF-Framatome program, open to external partners, in particular the European Community in the frame of the 5th FW Program.

The experimental programs allow to validate nuclear data and calculation methods used to describe the sub-critical core, in terms of reactivity, spatial flux distributions, neutron spectra and external source worth. If the source can be used in continuous and pulsed modes, static and dynamic reactivity measurements are possible. This point is of relevance, since the experimental investigation of the different techniques to monitor the sub-criticality level during the operation of an ADS is still an open question.

The future MUSE program will enter a new phase in november 1999, with the installation at MASURCA of a deuteron accelerator (GENEPI accelerator), developed at the CNRS/IN2P3/ISN of Grenoble. Improved performances are expected (in terms of the quality of the neutron pulse and source intensity), and the use of both (D,D) and (D,T) reactions, will enable to explore different neutron spectra as well as source worths and their ratios to the fission neutron worths.

The paper presents the GENEPI accelerator characteristics and monitoring and the experimental configurations defined for the next phase of the MUSE experiments.

Presenting author : Dr Roland SOULE is in charge at CEA Cadarache of the experimental programs performed in the MASURCA critical facility in support to fast neutron systems.

¹*Commissariat à l'Energie Atomique,
Centre d'Etudes de Cadarache,
Département d'Etudes des Réacteurs,
13108 Saint Paul lez Durance Cedex,
France*

e-mail : rsoule@cea.fr
or soule@baobab4.cad.cea.fr

²*Institut des Sciences Nucléaires,
CNRS/IN2P3/UJF
53, Avenue des martyrs
38026 Grenoble Cedex, France*

³*EdF/DER
1, Avenue du Général de Gaulle
92141 Clamart Cedex, France*

⁴*FRAMATOME
10, Rue Juliette Recamier
69456 Lyon Cedex 06, France*