Nuclear technology applications at the GELINA time-of-flight facility

Peter Schillebeeckx[A]

[A]Joint Research Centre, European Commission
EC-JRC Geel (Belgium)

Abstract

Neutron technology applications at the JRC Geel will be presented, with an emphasis on the activities at the time-of-flight facility GELINA. JRC Geel operates in addition to GELINA a 3 MV tandem generator (MONNET). GELINA and MONNET are mainly used to produce nuclear data of interest to various disciplines in nuclear science and technology. At MONNET quasi-monoenergetic neutron beams are produced by charged particle induced neutron reactions. The neutron time-of-flight facility GELINA has been especially designed for high quality neutron-induced reaction cross section studies in the resonance region. It is a multi-user facility, serving up to 10 different experiments simultaneously, and providing a pulsed white neutron source, with a neutron energy range between 10 meV and 20 MeV, a time resolution of 2 ns and flight path lengths ranging from 10m to 400m. The measurement stations at GELINA are equipped with a wide variety of detection systems designed to study neutron induced reactions. There are set-up for transmission experiments and capture, fission, charged particle and elastic and in-elastic cross section measurements. The measurement program addresses data needs associated with a wide range of nuclear energy applications. The facilities together with their measurement equipment will be presented together with results of recent experiments. Most of the experiments at GELINA are in support to nuclear energy applications. In addition, collaboration activities with institutes and universities from the Republic of Korea will be highlighted. Finally the use of resonances as a basis of two non-destructive methods, i.e. NRCA (neutron resonance capture analysis) and NRTA (neutron resonance transmission analysis), will be presented. These are NDA techniques to determine the elemental and isotopic composition of materials and objects. The use of NRTA to characterize complex materials will be discussed.