MODELIZATION OF THE RADON EMANATION FROM NATURAL SOURCES IN THE SOIL

A.SABIR[1], H.MARAH[1], D.KLEIN[2], L.HLOU[1] and A.CHAMBAUDET[3]

1 Laboratoire de Physique Nucléaire Appliquée, Université IBN Tofail, Faculté des Sciences, Département de Physique, Kénitra Maroc.
2 Laboratoire de Métrologie des Interfaces Techniques et antenne Nord Franche-Comté, BP 427, 25211 Montbéliard Cedex, France
3 Laboratoire de Microanalyses Nucléaires, Université de Franche Comté, UFR des Sciences et des Techniques, 16 Route de Gray, 25030 Besançon Cedex, France

Radon is a natural radioactive gas from the uranium family which is the main component of the annual natural radiation exposure of the population. It has been shown in several epidemiological studies that this gas, when inhaled, provokes lung cancer.
Part of the radon formed in the earth's crust can migrate to the atmosphere through cracks and fissures by transport mechanisms (diffusion and fluid convection). Different parameters such as the localisation of radon sources, the porosity, the humidity of the soil can influence this migration and therefore the radon emanation in the atmosphere.
To evaluate the radon emanation and hence the risk to populations, we have adapted an original mathematical model based on the method of distribute parcels (L.Hlou, These d'état, Faculté des Sciences, Kénitra, MAROC, 1994). This allows us to follow the migration, in time and space, of a quantity of radon produced in a unit volume as a function of the geological, morphological and structural characteristics of the site studied. Knowing the petrographic and pedologic parameters enables us to calculate the radon concentration in all points inside the soil of the site as well as the radon emanation in the atmosphere. It is therefore possible to calculate the radiological risk for populations brought to live on the site studied.
Different applications of this model have been realised in Morocco and in France to demonstrate its efficiency.