Simulation of Physical Phenomena Intervening in the Interaction of X Ray -Matter with Monte Carlo Method

Yazid LAIB DIT LEKSIR, Hocine BENDJAMA, Aicha ALLAG, Redouane DRAI
Welding and NDT Research Center (CSC), BP 64, Cheraga, Algeria

Abstract:

The X-ray imaging techniques, such as radiography, radioscopy and tomography are used in various applications, particular in the medical field and material science. According to the material density, the geometry and applied energy, the beam X-rays can penetrate in material to analyze with a depth of several centimetres and bring information in depths among the defects of macroscopic and microscopic structures. The X-ray beam applications rest on total phenomena resulting from the elementary interactions which occur between the photons X and materials. Then it is necessary to know the physical phenomena which produced in the sources, in the object and the detection system. This paper studies by modelling, the phenomena resulting from the interaction photon X and material, by approximating a model which takes into account attenuation laws and the Monte Carlo method. We have developed a numerical model by analogy with the author's studies and an example of statistical simulation is presented for monochromatic beam of photons X and for a homogeneous finite and semi-infinite target SiO2. We classified the various physical events which can occur, with a percentage of appearance. This calculation makes it possible to identify the event dominating; the other least probable processes (which we can call them minority phenomena) can bring other information during analysis of a microstructure and will be negligible in the case of an analysis of macrostructures. In general we can identify these phenomena by undesirable mechanisms which disturb the analysis

Keywords : radiography, X Ray, Monte Carlo Method