

New Calculation Method of the Solid Angle Subtended by a Circular Disk at a Point

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Abstract

New calculation method of the solid angle subtended by a circular disk at a point is presented. For verification of this method, the comparison with Gardner's calculation solid angle subtended by a disk at a point lies on the axis of a disk and average solid angle subtended by a circular disk to a parallel coaxial disk is performed.

Development of Integrated Code for Gamma Camera Design (INCOGAM)

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Abstract

So as to develop a gamma camera for functional imaging, which consists of a collimator, a scintillation crystal, an optical guide, PMT array and position determination circuit, the total response of this system has been estimated using several simulation programs. MCNP4B, DETECT97, and Anger program were used to investigate the response of each component. A collimator for general purpose, 12" x 12" x 3/8" NaI(Tl) crystal, and 23 PMTs for charge amplification with each 5" diameter were considered as the components of gamma camera detector in this work. Interactions of gamma photons in the collimator and crystal were simulated using MCNP4B for estimating the distribution of energy absorption in crystal and interactions of optical photons in the crystal and optical guide were simulated using DETECT97 for estimating the distribution of optical photons out of crystal. The position determination of source was investigated using our own Anger program, which was developed to calculate positions of incident photons in the gamma camera. The main code which is integrated three simulation codes, named INCOGAM (Integrated Code for Gamma Camera Design), automatically creates each inputs and analyzes each outputs. INCOGAM provides 2-D digital image of source finally. The proto-type gamma camera has been developed based on the simulation results. The two images of planar source, acquired by simulation and experimental measurement with Co-57 source, are agreed well to each other. INCOGAM may be used to estimate total response of gamma camera as well as other imaging systems having similar detector structure.