Benchmark Calculations for EGS5 *

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Abstract

In the past few years, EGS4 has undergone an extensive upgrade to EGS5, in particularly in the areas of low-energy electron physics, low-energy photon physics, PEGS cross section generation, and the coding from Mortran to Fortran programming. Benchmark calculations have been made to assure the accuracy, reliability and high quality of the EGS5 code system. This study reports three benchmark examples that show the successful upgrade from EGS4 to EGS5 based on the excellent agreements among EGS4, EGS5 and measurements. The first benchmark example is the 1969 Crannell Experiment to measure the three-dimensional distribution of energy deposition for 1-GeV electrons shower in water and aluminum tanks. The second example is the 1995 Compton-scattered spectra measurements for 20-40 keV, linearly polarized photon by Namito et. al., in KEK, which was a main part of the low-energy photon expansion work for both EGS4 and EGS5. The third example is the 1986 heterogeneity benchmark experiment by Shortt et. al., who used a monoenergetic 20-MeV electron beam to hit the front face of a water tank containing both air and aluminum cylinders and measured spatial depth dose distribution using a small solid-state detector.