

Optimization of Radiation Loads during Extra Vehicular Activity Based on East-West Asymmetry Effect of High Energy Trapped Protons

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The ORLAN-M spacesuit shielding model is presented. The state standard of the Russian anthropomorphic phantom is used as a cosmonaut body model. The anthropomorphic phantom consists of 10 different parts, each of them being determined with its own coordinate system. Representative points inside the phantom simulate central nervous system, blood-forming system, eye lens, skin, testis and other critical organs of a human body. The shielding model is determined based on available technical documents and experimental studies with gamma- and beta- sources carried out in Russia. The doses in cosmonaut's critical organs during extra vehicular activity (EVA) are calculated taking into account cosmonaut's body self-shielding together with the additional spacesuit shielding. The shielding functions of the human body critical organs inside the spacesuit are compared with that in the Torso phantom placed inside the container (Matroshka experiment). The east-west asymmetry effect of high energy trapped protons is also studied for optimization of the radiation loads during EVA at a typical ISS orbit in solar minimum and solar maximum.