

AbstractID: 1743 Title: The X, Y symmetry model for head scatter data approximation: the rectangular scatter integration model (RSI)

Most of the current models used to describe head scatter are based on functions showing radial symmetry. Generally, such models are deduced from scatter measurements involving circular or square radiation fields. Typical examples are the equivalent square field method, the Clarkson integration method, the extended source model and the recently introduced and more complex multi-source models. This paper presents a mathematically simple and precise approximation method for head scatter data: the rectangular scatter integration model (**RSI**). Like other models, it is used to distinguish the primary component from the scattered radiation. The difference is in the scatter function which depends on the X_1 , X_2 and Y jaw positions. This form of the scatter function is reliable for cases of symmetry or asymmetry in the X and/or Y direction and it is essential for the description of asymmetric and wedged fields. The set of head scatter data measured for a 25 MV RX beam from an Elekta SL-25 was used to introduce the **RSI** model. It was systematically applied to a set of 234 open fields and to a set of 175 wedged fields. The results obtained show that the **RSI** model produced an excellent approximation for the head scatter data since practically all ionizations calculated for the open and wedged fields predicted the measured ones to within less than $\pm 1.0\%$. Of course, numerical integration of the head scatter is carried out in X , Y directions by small strips defined by the MLC leaves (no radial integration involved).