

A novel approach to electron fields matching was introduced recently. Dose uniformity is achieved through beam-edge modification by means of a penumbra generator placed on the electron applicator insertion plate. By blocking part of the beam on the side of abutment, the penumbra generator reduces the electron fluence and generates a wide and smooth penumbra, ideal for field matching. In order to obtain a fully integrated treatment technique, these modified electron beams were included into our commercial treatment planning system. The solution adopted uses the ability of the system to allow beam modifiers for electron beams. The modified penumbra is obtained by optimization of the modifier shape in order to match the measured data. Slab beams having a width of 0.5 cm were calculated by the treatment planning system for the various electron beam energies of interest. The calculation matrix data of these slab beams were exported in an optimization program that calculates modified beam profiles at two different depths by summing the appropriately weighted slab beams. An iterative procedure is used to optimize the weight of every slab beam in order for the calculated profiles to reproduce the measured data. The weights obtained in this way can be simply used to calculate the modifier shape to be entered in the treatment planning system. A complete set of beam modifiers is obtained in this way for a given range of beam geometry. Plans with multiple field arrangements can be computed with a precision of a few percents.