The abutment of a single energy megavoltage electron field against another megavoltage electron field can give rise to large dose heterogeneities at the junction between the fields due to the overlap of the penumbras of the fields. The positioning and/or shape of an electron field's penumbra has been attempted by physical device (Kurup (1992), Kalend (1985)) and SSD adjustment (Maor (1985), Lachance (1997)). While not completely eliminating the problem, Harms and Purdy demonstrated the usefulness of an energy and SSD dependent gap distance in order to reduce the size of the dose heterogeneities occurring at the border. Now, a pre-planning radiotherapy software, in addition to computing the proper linear combinations of megavoltage electron beams in order to create homogeneous composite dose distributions, also enables the user to control the composite field penumbras at the border. The bolus thickness and field weights of the linear combination of electron beams in each field are passed into a Fermi-Eyges based penumbral calculator for a calculation of the composite $D_{80/20}$ for each field. By choosing solutions exhibiting the largest $D_{80/20}$, the potential for hot spots at the border of the field are minimized such as from setup error. The increase in the distance over which the dose falls from 80% to 20% of the maximum also acts to reduce the potential for under dose resulting from use of gaps compounded by setup error and/or motion.
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