

## **The Effects of Intra-Fraction Organ Motion on The Delivery of Intensity-Modulated Field With a Multileaf Collimator.**

Intensity-modulated field can be conveniently delivered with a Peacock/MiMIC device or a conventional MLC, the latter can operate either in continuous mode or in step-and-shoot mode. Regardless of which device or mode is used, the entire intensity-modulated field is not delivered at once. Rather, it is composed of many small fields, that is, only a small 'window' of the field is irradiated at any given instant. If the treatment volume is stationary during beam-on, then the total dose is the sum of the doses delivered from these small fields. However, if the volume moves during beam-on, then part of the volume may move in or out of the 'window', resulting in dose delivered to be different from what was planned.

In this work, we describe a method that calculates the effects on dose delivered due to this type of organ motion, for a single fraction as well as for multiple fractions. Using this method, we estimated the effects on a breast treatment with IMRT techniques. We concluded that if the magnitude of motion is less than  $\pm 3\text{mm}$ , the effects are minimal over a typical course of treatment. Beyond that, the effect may be significant. In this case, alternative means must be considered, such as compensator or breath-hold techniques.