

**Purpose:** Helical tomotherapy can be useful in the treatment of superficial treatment volumes. As a consequence of the helical delivery, a thread pattern is evident in measured dose distributions. This goal of this work is to reduce this effect.

**Methods:** Radiation treatment plans were created utilizing pitches of 0.287, 0.360, 0.430 and 0.500 with a 5 cm field width with the helical tomotherapy treatment planning system (TPS). The plans were delivered to a cylindrical solid water phantom with 1.0 cm bolus. EDR2 film was placed between the solid water and the bolus in the target volume region. Back-to-back delivery of procedures with different pitch to constitute a single treatment fraction was considered.

**Results:** The measured percent difference of minima and maxima of the thread pattern was determined to be 5%, 12%, 10%, and 16% for pitch values of 0.287, 0.360, 0.430 and 0.500, respectively. The calculated thread magnitude was within 2% of the measured. Combining procedures with pitches of 0.287 & 0.360 and 0.287 & 0.430 resulted in interference patterns in the threading. For the pitch combination of 0.287 & 0.430, reduced variation (~3%) was largely observed; however, limited regions of greater magnitude minima and maxima ( $\pm 5\%$  of the mean dose) were also observed. An attempt was made to modify the target volume in order to create two plans with equal pitch values that combine to form a destructive interference pattern and, hence, a uniform dose. However, this was not readily achievable with the clinical version of the TPS.

**Conclusions:** The thread pattern can be mitigated with the use of a combination of delivery procedures with differing pitch, specifically 0.287 and 0.430. The TPS was able to predict the magnitude of the thread effect within 2% of the measured for the superficial target for all cases considered.