ARGON GAS-PUFF RADIUS OPTIMIZATION FOR SATURN OPERATING IN THE LONG-PULSE MODE*

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Argon gas puff experiments using the long pulse mode of Saturn (230-ns rise time) have promise to increase the coupled energy and simplify operations because the voltage is reduced in vacuum and the forward-going energy is higher for the same Marx charge. The issue addressed in this work is to determine if the 12-cm-diameter triple nozzle used in Saturn long-pulse-mode experiments to date[1] provides maximum K-shell yield, or if a different-radius nozzle provides additional radiation. Long-pulse implosions are modeled by starting with measured density distributions from the existing 12-cm-diameter nozzle[2], and then varying the outer radius in an implosion-energy-conserving self-similar manner to predict the gas-puff diameter that results in the maximum K-shell yield. The snowplow-implosions and multi-zone radiation transport[3] models used in the analysis are benchmarked against detailed measurements from the 12-cm-diameter experiments. These calculations indicate that the maximum K-shell emission is produced with very nearly the existing nozzle radius.

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