

MODELING OF PSEUDOSPARK PULSED PLASMA X-RAY GENERATION FOR PORTABLE MEDICAL DEVICES

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Modern x-ray devices typically rely on a high energy electron beam impinging on a target. Thermal requirements, due to the high energy source, impede the miniaturization of these devices to be used in portable applications. Plasma-based electron sources allow the generation of bremsstrahlung radiation while reducing the necessary beam power. Therefore, an investigation of pseudospark pulsed plasma x-ray generation will be conducted. Modeling of this device will be conducted in two stages. First, a plasma model of the pseudospark electron beam will be simulated using XOOPIC¹ to determine the beam spot-size and amount of current impinging on a high-Z material target. Second, the Integrated TIGER Series (ITS)² codes will be used to determine bremsstrahlung x-ray energies, spot-size and direction. Modeling results will be used to optimize a portable medical imaging device.

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2. J.A. Halbleib, R.P. Kensek, G.D. Valdez, T.A. Mehlhorn, S.M. Seltzer, M.J. Berger, "ITS Version 3.0: The Integrated TIGER Series of coupled electron/photon Monte Carlo transport codes", Sandia Report SAND-93-1010C.

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