Development and Benchmark Studies of the Indiana Rf Photocathode Source Simulator* DANIEL BOLTON[1], CHONG SHIK PARK, MARK HESS, Indiana University Cyclotron Facility — The Indiana Rf Photocathode Source Simulator (IRPSS) code is being developed to calculate the electromagnetic fields created by an electron beam in a photoinjector, and to simulate the effects of these fields on the beam using time-dependent Green's function methods. In this poster, we show initial IRPSS simulation results for a simplified photoinjector geometry consisting of a semi-infinite cylindrical pipe and cathode using the experimental parameters for the BNL 1.6 GHz photocathode gun [1]. We also show the excellent agreement within a benchmark study between the IRPSS code operating with the same simplified geometry and the analytical solution for a disk-like bunch and its "image" bunch propagating with uniform velocities in opposite directions with free space boundary conditions. Our benchmark study has demonstrated that the effects of self-fields reflecting from the pipe, as well as the electromagnetic shock fronts due to causality conditions, may be significant in understanding the physics of photoinjectors. *This research is supported in part by the NSF REU program. [1] K. Batchelor et al, "Development of a High Brightness Electron Gun for the Accelerator Test Facility at Brookhaven National Laboratory", EPAC'88, Rome, June 1988.

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