Abstract Submitted
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Modeling Relativistic Jets Using the Athena Hydrodynamics Code[1] DAVID PAULS, MAXWELL POLLACK, PAUL WIITA, The College of New Jersey — We used the Athena hydrodynamics code (Beckwith & Stone 2011) to model early-stage two-dimensional relativistic jets as approximations to the growth of radio-loud active galactic nuclei. We analyzed variability of the radio emission by calculating fluxes from a vertical strip of zones behind a standing shock, as discussed in the accompanying poster. We found the advance speed of the jet bow shock for various input jet velocities and jet-to-ambient density ratios. Faster jets and higher jet densities produce faster shock advances. We investigated the effects of parameters such as the Courant-Friedrichs-Lewy number, the input jet velocity, and the density ratio on the stability of the simulated jet, finding that numerical instabilities grow rapidly when the CFL number is above 0.1. We found that greater jet input velocities and higher density ratios lengthen the time the jet remains stable. We also examined the effects of the boundary conditions, the CFL number, the input jet velocity, the grid resolution, and the density ratio on the premature termination of Athena code. We found that a grid of 1200 by 1000 zones allows the code to run with minimal errors, while still maintaining an adequate resolution.

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David Pauls
The College of New Jersey

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