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Flux Variability from Turbulence and Bulk Velocity Variations in Relativistic Hydrodynamic Jets[1] MAXWELL POLLACK, DAVID PAULS, PAUL WIITA, The College of New Jersey — We simulated relativistic hydrodynamic jets using the Athena MHD code incorporating special relativity (Beckwith & Stone 2011). We compared the long-timescale variations produced by changes in the bulk velocity within the jet, amplified by Doppler boosting, to the short-timescale variations caused by turbulence in the flow. The flux variability due to changes in bulk velocity was calculated along a band spanning the width of the jet at a fixed distance down its stream, positioned just behind a reconfinement shock. We computed the relativistic turbulence variability by summing the results from our relativistic turbulence code over multiple zones; this required incorporating time delays. Power Spectral Densities were then computed for both turbulent and bulk velocity flux variations, and compared. For reasonable jet widths of $\sim$40 light-years, we found turbulent fluctuations on timescales of days to years and bulk-velocity variations contributing on longer timescales. We found that the slopes of the turbulent and bulk PSDs were usually between -1.5 and -2.2, in accord with observations of Active Galactic Nuclei.

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