

# Analytical Model of Magnetically Dominated Jets and Winds: Jet Launching, Acceleration, and Collimation

*Monday, 1 March 2021 14:30 (30 minutes)*

Jets/winds are ubiquitously in association with different celestial objects. However, most of previous theoretical studies of them rely on numerical calculations, not being able to provide a more convenient way for understanding rather abundant observational results. Now we have obtained a general analytical solution for describing a magnetically dominated jet/wind, through separating the “core” equation (which maintains the radial dynamic equilibrium of jet, constructed 1960s) into rotating and non-rotating terms, finding that each of the two-term equations can be solved analytically, and the two solutions match each other very well. This solution is consistent with known theoretical results and numerical simulations, and can be used to interpret main observational results, such as jet shape configuration, acceleration profile (from non-relativistic to relativistic), and polarization pattern etc. Furthermore, the solution is applicable to, e.g., limb-brightening (a hollow jet), periodical signals (a helical jet), and “complex” proper motion pattern (a stratified jet) etc. In this talk, I will present the details of the theory, examples of comparing with observations, and a variety of predictions (Ref. Chen & Zhang, 2021, ApJ, 906, 105).

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