Outflows of magnetized rotators: Structure and collimation

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Abstract

A simplified set of equations for the collimation and acceleration of rotating magnetized winds is presented assuming the shape of poloidal magnetic field lines up to fast magnetosonic point. The equilibrium perpendicular to the flux surfaces is calculated at the Alfvénic surface. Together with the regularity condition at the slow and fast magnetosonic surfaces, this determines energy, angular momentum and mass flux in the jet together with the shape of the critical surfaces. This allows to give an asymptotically collimated structure in equilibrium with the surrounding medium, consistent with the collimation process. Analytical and numerical results will be presented for a wide range of parameters such as rotation, entropy and mass loss rate. Astrophysical consequences will be discussed.