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Vector fields around black hole spacetimes

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For centuries, a description of the Universe has been searched for. Currently, the most acceptable theory that describes the geometry of the Universe is General Relativity (GR). Tests of GR in weak gravitational fields have been done and corroborate this theory. Now it is the era to test GR in regions of strong gravity: close to black holes, using the data from the observations of Event Horizon Telescope or LIGO (in the future, LISA). Black holes cannot be observed directly. To understand them, it is needed to see how matter behaves around black holes. Focusing on vector fields around rotating black holes (in GR), there is a recent work that decouples and separates the equations of motion for these fields. My work is to apply this formalism to vector fields with more curvature couplings and see which couplings allow for separation and decoupling. Possible numerical calculations might be done for the quasinormal modes of these fields.

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