The Quasinormal Modes of the Kerr-Newman Spacetime in the Small Charge Limit[1] ZACHARY MARK, Oberlin College, HUAN YANG, Perimeter Institute for Theoretical Physics, AARON ZIMMERMAN, Canadian Institute for Theoretical Astrophysics, YANBEI CHEN, California Institute of Technology — The quasinormal modes (QNM) solutions of the linearized Einstein equations are important tools for calculating gravitational waveforms from astrophysical systems and for considering the stability of the background spacetime. The equations governing perturbing fields on a Kerr-Newman background fail to separate or decouple, making an exact calculation of the QNM frequencies currently intractable. In this study we circumvent this issue by looking at the limit $Q \ll M$. In this regime, we can apply perturbation theory a second time to the small charge parameter $q = Q^2/M^2$ and semi-analytically arrive at the QNM frequencies to first order in q.

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