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A near-horizon expansion of second-order black hole perturbations

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The first detection of gravitational waves (GWs) from merger of binary black hole (BH) by advanced LIGO has opened a new window to test general relativity. In the future, extreme-mass-ratio inspirals (EMRIs), in which stellar-mass compact objects of mass μ spiral into a supermassive black holes (SMBHs) of mass M , are expected to be observed by LISA. Such systems can be expressed by using the BH perturbation approach, where we expand equations in the mass ratio μ/M . In order to extract physical parameters from GW observations, the second-order perturbations must be considered. However, naive calculations lead to a divergence of the second-order perturbations around boundaries. In this talk, we will seek a counterterm to avoid such a divergence around the event horizon of the SMBH.

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