

Waveform systematic bias in the ringdown analysis with LISA

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The inaccurate modeling of the gravitational wave templates that are used for analysing gravitational wave signals can lead to a systematic bias in the parameter estimation. This inaccuracy can be related to the lack of terms in the waveform coming from fundamental physics or astrophysical environments or to some truncation in perturbation theory. This issue is going to be more relevant for upcoming detectors, given the large signal-to-noise ratios that they will be able to reach. In this work, we focus on LISA and compute the bias arising from an incomplete description of the ringdown waveform, due to the exclusion of some modes. We first study the hierarchy of the modes for different events and then compare a template including 12 modes to incomplete templates with $N < 12$ modes. We define the minimum N needed for having an unbiased parameter estimation and discuss how this quantity varies across the parameter space.

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