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Excitation of Trapped Oscillations in Accretion Disks Around Black Holes III

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In order to study the origin of high-frequency quasi-periodic oscillations (HFQPOs) observed in X-ray binaries, Kato (2004) suggested a resonant excitation mechanism of disk oscillation in deformed disks. Following the formulation by Kato (2008), we have been studying numerically whether the resonant coupling of intermediate oscillation with mode number $(\tilde{m}, \tilde{n}) = (1,0)$ and the disk deformation (in our case a warped disk) excites the original oscillation trapped in the inner region of the accretion disk. In the previous meeting, we have presented the results, where for simplicity, we took a rigid tilt as the warp solution. One of our major conclusions was that no fundamental g-mode is excited.

In this study, we adopt a more realistic warp solution where the disk tilt varies with radius. We have found that the fundamental modes of trapped g-mode oscillations with eigenfrequencies close to the maximum of epicyclic frequencies are excited except for the non-rotating black holes systems. The growth rates are higher for a faster rotating systems and for a higher warp amplitude at inner radius. We have also found that the growth rates decreases as the sound speed increases.