

SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

Dia 5 de Dezembro (terça-feira), às 13h30, sala 6.2.33

Resonance tongues in the linear Sitnikov equation

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Abstract: It is studied a Hill's equation, depending on two parameters $e \in [0,1)$ and $\Lambda > 0$, that has applications to some problems in Celestial Mechanics of the Sitnikov-type. Due to the nonlinearity of the eccentricity parameter e and the coexistence problem, the stability diagram in the (e, Λ) -plane presents unusual resonance tongues emerging from points $(0, (n/2)^2)$, $n = 1, 2, \dots$. The tongues bounded by curves of eigenvalues corresponding to 2π -periodic solutions collapse into a single curve of coexistence (for which there exist two independent 2π -periodic eigenfunctions), whereas the remaining tongues have no pockets and are very thin.

Unlike most of the literature related to resonance tongues and Sitnikov-type problems, the study of the tongues is made from a global point of view in the whole range of $e \in [0,1)$. We apply the stability diagram of our equation to determine the regions for which the equilibrium of a Sitnikov $(N + 1)$ -body problem is stable in the sense of Lyapunov and the regions having symmetric periodic solutions with a given number of zeros.

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