

## **SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS**

**Dia 11 de Dezembro (terça-feira), às 13H30, na sala 6.2.33**

### **Some rigorous results on the 1:1 resonance of the spin-orbit problem**

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#### **Abstract**

We study the classical planar spin-orbit model of Celestial Mechanics (motion of a satellite influenced by tidal effects) from an analytical point of view, with no requirements of smallness of the orbital eccentricity and taking into account dissipative forces. The problem depends on  $e$ , the eccentricity of the orbit, and on  $\Lambda$ , the oblateness of the spinning body. Our main concern is the capture into the 1:1 resonance for points of the  $(e, \Lambda)$ -plane. First, we find a region of uniqueness of the 1:1 resonance, which is the continuation from the solution for  $e = 0$ . Then, a subregion of linear stability is estimated. We also study a separatrix close to the line  $e = e_* \approx 0.682$ , beyond which the resonance is unstable. Finally, we study the dissipative case by giving estimations for regions of asymptotic stability of the solution (capture into resonance) depending on the strength of the dissipation

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