

UNICAMP – IMECC  
Departamento de Matemática

## Seminário de Sistemas Dinâmicos e Estocásticos

**Expositor:** B. Ferčec (University of Maribor)

**Título:** An approach to studying isochronicity problem  
and bifurcations of critical periods

**Data:** Segunda-feira, 12 de agosto de 2013, 14h

**Local:** Sala 322 do IMECC

**Resumo.** We consider real system of ordinary differential equations of the form

$$\begin{aligned}\dot{u} &= -v + \sum_{i+j=2}^n \alpha_{ij} u^i v^j = -v + U(u, v), \\ \dot{v} &= u + \sum_{i+j=2}^n \beta_{ij} u^i v^j = u + V(u, v).\end{aligned}$$

If in the neighborhood of the origin all solutions are periodic, that is, the corresponding trajectories are closed then the singular point at the origin is center. If some system has a center then the next question is whether the center is isochronous. By definition, if all periodic solutions in a neighborhood of the center have the same period, then the center is isochronous. The isochronicity problem is to find conditions on the parameters of the system for which the center is isochronous. Another problem under our consideration and which is closely related to the problem of center and isochronicity problem is the problem of bifurcations of critical periods.

In the talk we first present a method for determining whether or not the center is isochronous. For this purpose we describe the period

function. We present an approach for computing the period function in polar coordinates and another one which is based on normal form theory. Then we apply described approaches for solving the isochronicity problem and the problem of critical periods for some families of polynomial cubic systems.

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