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Modeling, analysis, and control of biological oscillators

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Propositions
belonging to the thesis entitled
Modeling, Analysis, and Control of Biological Oscillators
by

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1. The Goodwin's oscillator is a simplified and cyclic model of endocrine regulation; a more complete model should have more feedback loops, leading to a non-cyclic feedback system. (Chapters 4 & 5)

2. Using an appropriate change of variables, a non-cyclic feedback system may be transformed to a cyclic one. (Chapter 5)

3. Bifurcation theory is a useful tool for predicting qualitative changes in the behavior of solutions of ordinary differential equations with respect to parameter variations. (Chapters 6 & 7)

4. A mathematical model which is correctly built based on underlying biology can compliment the corresponding experimental system.
(Chapters 6 & 7)

5. Combination of geometric singular perturbation theory and the blow-up method is a powerful tool for the analysis of multiple-time-scale oscillators. (Chapter 7)

6. Carrying out research is similar to the blowing-up of a non-hyperbolic point as often a research problem has to be investigated from different angles, corresponding to defining different charts in the blow-up method.

7. Doing a PhD is an oscillatory process with a slow-fast nature.