



Łochów, 23rd–27th September 2014

MODIFIED MODEL OF ENDOCRINE SYSTEM (THE HYPOTHALAMUS-PITUITARY-THYROID AXIS)

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ABSTRACT

In this paper, we propose the extended mathematical model describing the hypothalamus-pituitary-thyroid homeostatic mechanism in endocrine system. We introduce to this system two feedbacks with delays. In our model feedback controls the secretion of thyroid hormones. We also present the results of numerical analysis.

REFERENCES

- [1] M. Degon, S. R. Chipkin, and C.V. Hollot: *A computational model of the human thyroid*, Mathematical Biosciences **212** (2008), 22–53.
- [2] J.W. Dietrich, G. Landgrafe, and E. Fotiadou: *TSH and Thyrotropic Agonists: Key Actors in Thyroid Homeostasis*, Journal of Thyroid Research (2012).
- [3] B. Pandiyan: *A patient specific model of the negative feedback control of the hypothalamus-pituitary-thyroid axis in autoimmune thyroiditis*, Mathematical Medicine and Biology (2013), 1–33.
- [4] B. Mukhopadhyay and R. Bhattacharyya: *A mathematical model describing the thyroid-pituitary axis with time delays in hormone transportation*, Applications of Mathematics **51** (2006), 549–564.
- [5] L. Danziger and G.L. Elmergreen: *Mechanism of periodic catatonia*, Confinia Neurol. **18** (1958), 159–166.
- [6] J. Hale and H. Kocak, Dynamics and Bifurcations, 1991.
- [7] F.M. Atay: *Van der Pol's Oscillator under Delayed Feedback*, J. Sound and Vibration **218** (1998), 333–339.