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BOOK OF ABSTRACTS

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The Dynamics of Two Linearly Coupled Goodwin Oscillators

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We study numerically a system of linearly coupled Goodwin oscillators for two regions, which, when isolated, differ in period and amplitude of regional business cycle. This system is described by the following equations [1]:

$$\varepsilon_1\theta_1\frac{d^2y_1}{dt^2} + (\gamma_1 - \varphi_1)\frac{dy_1}{dt} + s_1y_1 - \theta_1\left(m_1\frac{dy_1}{dt} - m_2\frac{dy_2}{dt}\right) - m_1y_1 + m_2y_2 = 0,$$

$$\varepsilon_2\theta_2\frac{d^2y_2}{dt^2} + (\gamma_2 - \varphi_2)\frac{dy_2}{dt} + s_2y_2 + \theta_2\left(m_1\frac{dy_1}{dt} - m_2\frac{dy_2}{dt}\right) + m_1y_1 - m_2y_2 = 0.$$

Here $y_i(t)$ = regional income, $\epsilon_i > 0$, $\theta_i > 0$ = time-lag of the dynamic multiplier and the time-lag between investment decisions and the resulting outlays, s_i = marginal propensity to save, $0 \le s_i \le 1$, $\gamma_i = \varepsilon_i + \theta_i s_i$, m_i = marginal propensity to import, $0 \le m_i \le 1$, $\varphi_i(x)$ = induced investment function, $\varphi_i(x) \ge 0$; $\varphi_i(0) = 0$; $\varphi_i'(0) = r_i > 0$; $\varphi(\dot{y}) \to -I_{\min i}$ if $x \to -\infty$; $\varphi_i(x) \to I_{\max i}$ if $x \to \infty$, $i = 1, 2$.

References

[1] T. Puu, *Nonlinear Economic Dynamics*, 4th edn, Springer-Verlag, Berlin and New York, 1997.

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