Distributed control in stabilization of a model of infection diseases

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In this talk we consider a model of infection diseases built by G.I. Marchik in the form of ordinary differential system

$$\begin{cases} \frac{dV}{dt} = \beta V(t) - \gamma F(t) V(t), \\ \frac{dC}{dt} = \zeta(m) \alpha F(t-\tau) V(t-\tau) \Theta(t-\tau-\tau_0) - \mu_c (C(t) - C^*), \\ \frac{dF}{dt} = \rho C(t) - \eta\gamma F(t) V(t) - \mu_f F(t), \\ \frac{dm}{dt} = \sigma V(t) - \mu_m m(t), \end{cases}$$

Here $V(t)$ is antigen concentration rate, $C(t)$ – plasma cell concentration rate, $F(t)$ – antibody concentration rate, C^* and F^* are the plasma rate concentration and antibody concentration of the healthy body respectively, $m(t)$ is relative features of the body.

Parameters α , β, γ, μ_f, μ_m, μ_c, σ, ρ, η are given parameters, $\zeta(m)$, $\Theta(t-\tau-\tau_0)$ are given functions.

We demonstrate that the control

$$u(t) = -b \int_0^t (F(s) - F^* - \varepsilon) e^{-k(t-s)} ds,$$

where b, k, e are positive constants can stabilize this system in the neighborhood of a stationary solution.