Controlling Mackey-Glass chaos

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The Mackey-Glass equation is the representative example of delay induced chaotic behavior. Here, we propose various control mechanisms so that otherwise erratic solutions are forced to converge to the positive equilibrium or to a periodic orbit oscillating around that equilibrium. We take advantage of some recent results of the delay differential literature, when a sufficiently large domain of the phase space has been shown to be attractive and invariant, where the system is governed by monotone delayed feedback and chaos is not possible due to some Poincaré-Bendixson type results. We systematically investigate what control mechanisms are suitable to drive the system into such a situation, and prove that constant perturbation, proportional feedback control, Pyragas control and state dependent delay control can all be efficient to control Mackey-Glass chaos with properly chosen control parameters.