

On the dominant roots of a class of delay equations

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We consider a class of linear delay differential equations and the problem of determining or assigning the dominant root of their characteristic equation, i.e., the root having the largest real part. Often the dominant root is not unique, but its real part is, which determines the speed of convergence to an equilibrium in case it is negative. We are particularly interested in the question whether all systems belonging to some parametrized class (or a single system with some uncertainty) can be ensured a common convergence rate by choosing a single optimal value of the control gain. We discuss the problem in the context of simple first order equations as well of some extensions, and present results pertaining to both discrete and distributed delays. We further address the question of the optimality of the control, which turns out to yield only a local optimum in some cases.