A DIFFERENTIAL EQUATION WITH A STATE-DEPENDENT QUEUEING DELAY

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We consider a differential equation with a state-dependent delay motivated by a queueing process. The time delay is determined by an algebraic equation involving the length of the queue for which a discontinuous differential equation holds. The new type of state-dependent delay raises some problems that are studied in this talk. We formulate an appropriate framework to handle the system, and show that the solutions define a Lipschitz continuous semiflow in the phase space. The second main result guarantees the existence of slowly oscillating periodic solutions. We achieve it by defining a proper convex subset of the phase space with a return map on it having a nontrivial fixed point.

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