Bonnet, Catherine; Partington, Jonathan R.; Sorine, Michel
Robust control and tracking of a delay system with discontinuous non-linearity in the feedback. (English) Zbl 0960.93042
Int. J. Control 72, No. 15, 1354-1364 (1999).

This paper solves the problem of simultaneous tracking and robust stabilization of a delay system that models the part of a car engine where the feedback employs the output from a relay sensor. This problem arises from the need of car depollution, where the underlying problem is to control the period of fuel injection so as to regulate the air-fuel ratio at the output of the car engine which is measured by a sensor of the relay type. The goal is actually to make the output of the car engine track a fixed sinusoid signal, which, as it has been established, when entering the catalytic converter produces an acceptable air-fuel ratio at its output. Various approaches using coprime factorization techniques are investigated, which can be extended to the more general type of delay systems $e^{-sh}[p(s, e^{-s})/q(s, e^{-s})]$ provided that they are BIBO-stable.

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MSC:
- 93C95 Application models in control theory
- 93B51 Design techniques (robust design, computer-aided design, etc.)
- 93D21 Adaptive or robust stabilization
- 93C23 Control/observation systems governed by functional-differential equations

Keywords: robust tracking; discontinuous nonlinearity; simultaneous tracking; robust stabilization; delay system; relay sensor; air-fuel ratio; coprime factorization

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