

Feedback Linearization Idle-Speed Control: Design and Experiments.

Rolf Pfiffner; Lino Guzzella

Abstract: This paper proposes a novel nonlinear control algorithm for idle-speed control of a gasoline engine. This controller is based on the feedback linearization approach and extends this technique to the special structure and specifications of the idle-speed problem. Special static precompensations and cascaded loops are used to achieve the desired bandwidth separation between the fast spark and slow air-bypass action. A key element is the inclusion of the (engine-speed dependent) induction to power stroke delay in the engine model and in the subsequent controller design. The proposed method is partially validated on an engine test bench using the air paths, only. For the analyzed five cylinder engine, the results show no superior behaviour of the nonlinear approach compared to classical idle-speed controllers. For engines with fewer cylinders, however, the nonlinear approach is expected to perform substantially better.

Keywords:

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