Controlling Engine System: a Low-Dimensional Dynamics in a Spark Ignition Engine of a Motorcycle

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We analyze a time series of the combustion pressure in the idle state, measured from a spark ignition engine of a motorcycle. It is clarified that the engine system can be described by a low-dimensional deterministic dynamics perturbed by some stochastic process. We also propose a method to stabilize the chaotic behaviour of engine’s data by adopting the Pyragas’ method. We actually use this method in a computer experiment for the control of combustion pressure data to demonstrate the efficiency of the proposed method. As a result of the experiment, we eliminate the fluctuations in the combustion pressure data and obtain a periodic orbit.

\textbf{Key words:} Nonlinear Time Series Analysis; Attractor Reconstruction; Combustion; Controlling Chaos; Delayed Feedback Control.