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IJCA Proceedings on International Conference and Workshop on Emerging Trends in Technology 2014

ICWET2014 - Number 2

Year of Publication: 2013

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{bibtex}icwet1434.bib{/bibtex}

Abstract

Over the last few decades, controllers found in the industries are mostly PID controllers. They have found large recognition and applications in several industries. The majority of the controllers used in process control are of PID type. The control loops which are not properly tuned, give reduced output and inappropriate and undesired performance. There are continuous researches going on to develop new methods for PID tuning and designing. A

number of algorithms have been developed by scientists and suitable methods depending upon the applications are adopted by the industries for PID tuning and designing. Several tuning methods are present but they have some restrictions. These methods do not give desired tuning parameterizations for the control systems which have higher order and delay systems. The method which is named as Dominant pole placement method provides better tuning parameterizations for the above mentioned type of systems. In this method a pair of desired poles is chosen such that the requirements of the control system are converted in terms of these chosen poles. These poles are termed as dominant poles. This is an easy design method which when implemented for various types of plant processes gives desired result. This type of controller can tune plant processes with long dead times, long time constants, and monotonic or oscillatory responses. In this method, desired closed loop performance which is performance specifications, are identified and then the dominant poles are converted in terms of these performance specifications. In this paper, the performance specifications are settling time and peak overshoot. Also constraints have been put on complementary sensitivity function to handle the high frequency noise rejection and to get more mathematical equations to solve further. The method is then extended to fractional order system with a fractional order controller. For fractional order model there is no direct method of expressing dominant poles in terms of performance specifications, so the method starts with the assumption of dominant poles. The procedure is simple, efficient and gives better performance for different types of control systems.

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Index Terms

Computer Science Applied Electronics

Keywords

Dominant Poles Pid Tuning Oustaloup Recursive Approximation Technique