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Input shaping predictive functional control for different types of challenging dynamics processes (Article) [\(Open Access\)](#)

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Abstract

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Predictive functional control (PFC) is a fast and effective controller that is widely used for processes with simple dynamics. This paper proposes some techniques for improving its reliability when applied to systems with more challenging dynamics, such as those with open-loop unstable poles, oscillatory modes, or integrating modes. One historical proposal considered is to eliminate or cancel the undesirable poles via input shaping of the predictions, but this approach is shown to sometimes result in relatively poor performance. Consequently, this paper proposes to shape these poles, rather than cancelling them, to further enhance the tuning, feasibility, and stability properties of PFC. The proposed modification is analysed and evaluated on several numerical examples and also a hardware application. © 2018 by the authors.

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