

Abstract Submitted  
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**A suboptimal feedback control theory based on a quadratic sensitivity and tabulation approach** YEOJEONG KIM, SEONGWON KANG<sup>1</sup>, Sogang Univ., Korea — The main objective of this study is to develop a new systematic flow control approach based on the suboptimal feedback control (SFC) theory by addressing a few issues in controlling flows for a practical purpose. The Frchet differential is applied to the governing equations to derive a systematic controller based on partial differential equations. In the previous SFC theory, a physical assumption or tuning process is necessary for a user-defined parameter to control flows successfully. In the present study, this issue is addressed by introducing an approximate optimality condition based on a quadratic control sensitivity. In order to build a practical control framework, the revised theory is reformulated as a tabulation approach using a modified Green's function method, which achieves both efficiency and accuracy. The effectiveness of the proposed method is tested using laminar and turbulent flows such as a two-dimensional Taylor vortex problem and turbulent channel flow. As a result, the proposed approach shows a similar or better control performance compared to the previous one, without a need to determine a control parameter.

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