

Nonlinear Observer Design for Dynamic Positioning

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Abstract

Recent developments in optimal observer design for dynamic positioning have led to applications of contraction analysis. In this paper a theoretical method for nonlinear optimal observer design and suboptimal observer using a state-dependent Riccati equation approach are presented. The observer will be compared to an existing observer and its properties and performance discussed. Early observer design for dynamic positioning (DP) focused on applying linear optimal observer theory to the linearized equations of motion. Because of the large number of free parameters and the lack of global stability, the research areas shifted to nonlinear observer design. The drawback of this approach however is that optimality is not guaranteed. Based on recent developments in the field of contraction theory, a theoretical optimal nonlinear observer is presented, yielding, together with a state-dependent Riccati equation approach, a suboptimal observer design. Performance and applicability of this new observer are compared to an existing observer.

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