

Self-calibration of Laser Tracking Systems

Hanqi Zhuang*, Shui H. Motaghedi**, Zvi S. Roth*, and Ying Bai*

*Department of Electrical Engineering
Florida Atlantic University
Boca Raton, FL 33433

**Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91109

Abstract

In this paper, a methodology for self-calibrating a multi-beam laser tracking measurement system with planar constraints is proposed. A model for the multiple-beam laser tracking system is derived. Through error analysis it is shown that using even rough angular measurement may improve the overall system calibration results. Parameter observability issues are studied for self-calibrating the multiple-beam laser tracking system. The results reveal the applicability of planar constraints to the system self-calibration. Results of simulation and experimentation on a prototype system are reported to show the applicability of the proposed calibration strategies.