

2004c

“Deterministic Three-Axis Attitude Determination,” M. D. Shuster, *The Journal of the Astronautical Sciences*, Vol. 52, No. 3, July–September 2004, pp. 405–419.

This work showed that there are no measurement sets composed of arc-length and direction measurements which lead to an unambiguous estimate of the attitude. All such attitude measurement sets are either overdeterminate or underdeterminate. The case of three geometrically independent arc-length (cosine) measurements or the measurement of a direction and a scalar, both of which one might expect to lead to an unambiguous result, in fact, lead to discrete degeneracies of the attitude solution. Specific algorithms are given for each set. It was to solve the problem of estimating the attitude from three scalar measurements in 2000d and 2004c that the generalized Euler angles were needed.

This work also contained a new approach to computing the covariance matrix for a deterministic attitude estimation algorithm, which was developed further in 2006b.

Superseded 1994a and 2000d.