Attitude-independent geomagnetic navigation using onboard complete three-axis magnetometer calibration

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Abstract: A real-time three-axis magnetometer calibration is integrated with a near-Earth-satellite geomagnetic navigation for the first time. To remove the effects of magnetometer biases, scale factors, and nonorthogonality corrections on accuracy of orbit determination, the paper presents a 16-dimensional-state extended Kalman filter which estimates the position-velocity vector, drag coefficients, and complete calibration parameters. An attitude-independent pseudo-measurement, which is converted from the body-measurement and geomagnetic-reference vectors, is used by the filter. Various computer-based simulations have been used to test the validity of the filter and to evaluate its performance. ©2008 IEEE.

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