A hybrid CAI/IMU solution for higher navigation performance

Benjamin Tennstedt, Nicolai Weddig, and Steffen Schön
Leibniz Uni Hannover, Institut für Erdmessung, Hannover, Germany (tennstedt@ife.uni-hannover.de)

Atom Interferometers as inertial sensors were getting quite some interest in the last decade. Several attempts have been made to combine the two sensors (i.e. classical inertial measurement units IMU and cold atom interferometers), mainly with the goal to use the atom interferometer as main sensor, and support it with different conventional sensors in order to suppress noise and achieve maximum sensitivity and long-term stability.

We present a quite promising combination of both sensors in an error state extended Kalman Filter framework aimed especially on further improving the performance of a conventional high end IMU. While the full potential of the cold atom interferometer is not yet entirely exploited in this combination, first simulations in terrestrial applications with small and even larger change of inertial forces show an increase of the navigation solution precision by a factor of 20 and more.