Implementing the Matrix Exponential Function on Embedded Processors

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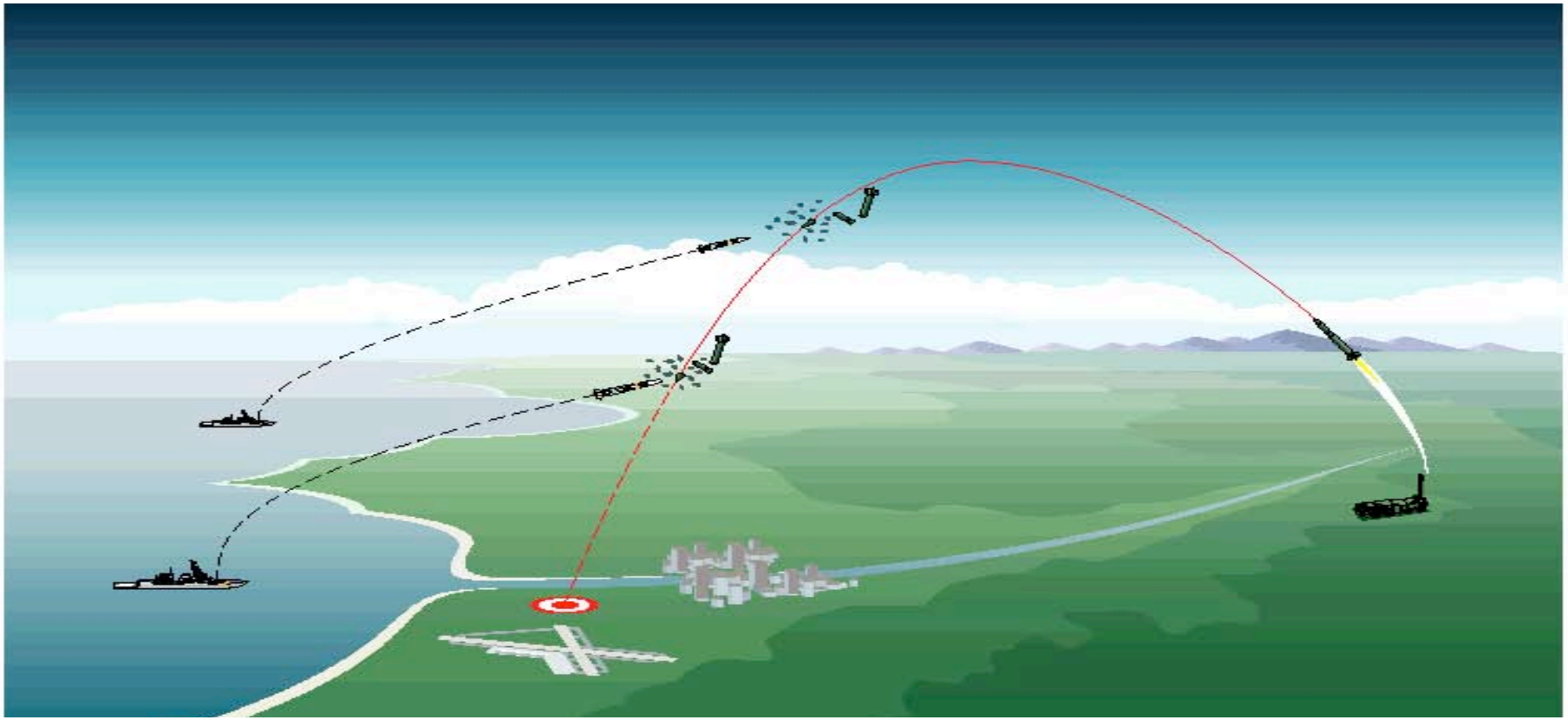
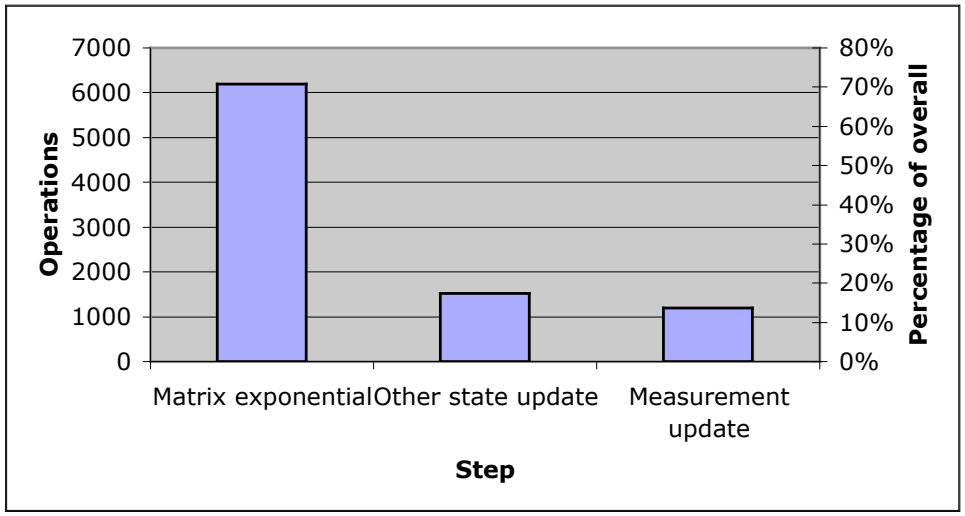
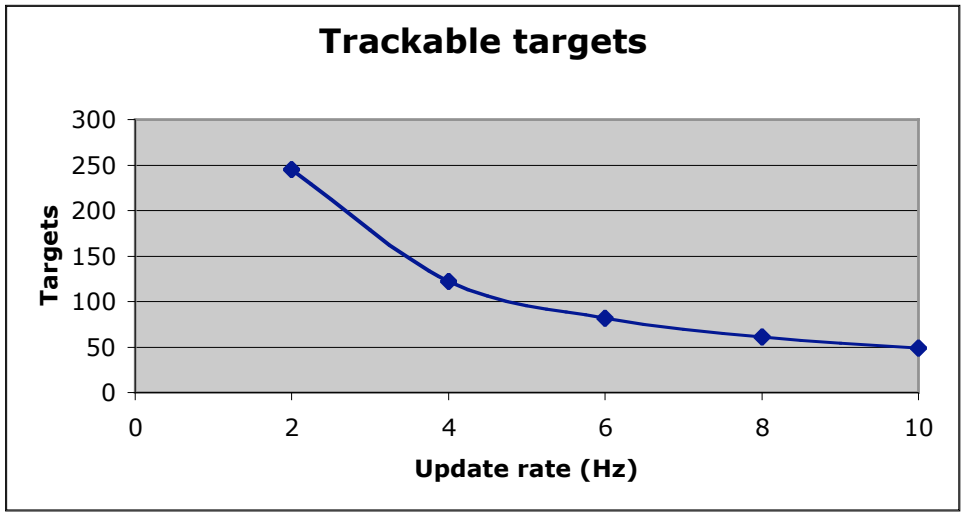
Application: Ballistic Target Tracking



- Tracking of a ballistic target using noisy measurements
- Tracking accomplished using the *extended Kalman filter*
  - "extended" means that system dynamics are non-linear

The Matrix Exponential in Tracking





- Matrix exponential is a substantial part of the EKF's operation count
- How many targets could a single processor track?
  - Assume 500 MHz PPC G4
  - Use execution time of 6x6 real matrix exponential
  - Assume remainder of EKF has efficiency comparable to LU factorization (~0.04%)
  - Vary track rate from 2-10 Hz
- A single processor can potentially track many targets