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Improved Methods for Tracking and Characterizing Inactive Resident Space Objects

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To date, work has been performed in autonomously fusing photometry and astrometry exploiting multiple model hypothesis testing with encouraging results for simultaneous resident space object (RSO) tracking and characterization. Photometric and astrometric data are complimentary in that they are sensitive to different aspects of the problem: photometry is sensitive to RSO characteristics and fairly insensitive to RSO orbit, whereas the astrometry is the opposite. The research demonstrates the ability to exploit these data to uniquely identify and discriminate these inactive RSOs whether they are alone or in a clutter. Research has also been performed in more accurately recovering and predicting the actual RSO state and parameter errors. This is now combined with the data fusion in order to enhance and improve the tracking and characterizing of inactive RSOs. A comparison between traditional Gaussian error assumptions and the Adaptive Entropy Gaussian Information Synthesis (AEGIS) method for approximating the actual error probability density function is demonstrated.