

Aerospace Seminar



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Space Weather at Low Earth Orbit: What a Drag

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The increasing congestion of the space environment is well known even outside of the space industry. Increases in space debris will eventually prevent the most useful orbital bands from being safely occupied, threatening commercial, civil, and military uses of space. The emerging approach to remediation involves both active debris removal and preventing future debris-producing events (conjunction assessment and collision avoidance operations). Spacecraft at Low Earth Orbit (LEO) are under continuous surveillance performing conjunction risk analyses to determine their probability of a collision (P_c). The greatest encumbrance to accurate P_c calculations today is the lack of reliable estimates of atmospheric drag and a reliable quantification of the uncertainty of the drag estimates. The largest uncertainty and greatest variability in specifying drag at LEO stems from poor representation of the mass density within which the spacecraft is immersed.

A pathway for insuring continuous and secure operations of spacecraft is to improve the estimate of the near-space environment state and predict its response to space weather events. This seminar will describe my research in applying observations and physics-based models to describe the LEO environment under changing solar conditions. In particular, mechanisms responsible for changes in the LEO gas mass density are described and future challenges are proffered.



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