



Stochastic Capability Models for Degrading Satellite Constellations

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Biblioscholar Dez 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x8 mm. This item is printed on demand - Print on Demand Neuware - This thesis proposes and analyzes a new measure of functional capability for satellite constellations that incorporates the instantaneous availability and mission effectiveness of individual satellites. The capability measure yields a continuous score between zero and one accounting for the degree to which the constellation meets operational requirements. The measure is computed from an average of satellite capabilities, composed of the product of the satellite's instantaneous availability and value score. Instantaneous availability is acquired by modeling the satellite degradation status as either a time-homogenous, continuous-time Markov chain (CTMC) if it possesses functions with exponential lifetime distributions, or as a time-homogenous, semi-Markov process (SMP) if the function lifetime distributions are not exponential. The satellite value score represents the individual satellite's contribution to the overall constellation mission and is obtained using multi-attribute value theory. For illustrative purposes, analytical results were compared with those obtained via the Monte Carlo method and were found to be indistinguishable with substantially less computational effort. 134 pp. Englisch.



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