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SPACE DEBRIS SYMPOSIUM (A6)
Space Debris Removal Issues (5)

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RESEARCH ON SIMULATION OF CAPTURING AND DETECTING SYSTEM OF SPACE DEBRIS REMOVA1 SPACECRAFT

Abstract

Space debris removal spacecraft is significant for solving the problem of space debris, which is increasing every year. Non-cooperative target detecting and capturing system are the key subsystems. Based on development of the system of non-cooperative target capturing, net-capturing system is designed. Based on analyzing the construction of space net, the paper built simple model of net and evaluation parameters. In order to analyze deferent factors how to affect deploy of net and the situation of the impact between space debris and net body, the paper design four simulation scenarios and simulate by ANSYS. The result shows that for the net have better error tolerance, casting angle should be 20d-25d; casting velocity should achieve threshold in order to deploy net in time; increasing cross section radius and elastic modulus can enhance anti-impact of net body. Based on analysis of detecting sensor, an active and passive detecting system is designed, which includes visible sensor and laser range finder. Combine Johnson vision rule with estimate model of visible sensor parameter, effective aperture and focal length are estimated simply. According to Planck's law, energy flux density of the sun in visible region is calculated. Through establishing the visible light irradiance model for plane targets, the irradiance model of space targets and space-based telescope is derived. Finally, the relationship between capability of visible sensor and phase angle, time of exposure, detecting distance, and dimension of target are analyzed.