Research On Asteroid Dynamic Behavior And Deflecting Defense Effect By Space-Based Laser-Driven  
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Abstract  
Asteroid impact events occurred frequently in history, causing numerous  
environmental disasters and biological extinction, which is a major potential  
threat to mankind. The defense of the asteroid impact has become a hot issue  
in the international community and a great challenge to the global space  
industry. This paper analyzes the identification of the threat of asteroid impact  
and the need for security deflecting defense. Based on the interaction  
mechanism between laser and material, a space-based laser array defense  
system is proposed to deflect the asteroid by laser ablation driven. The  
feasibility of deflecting asteroid using space-based laser deflection array  
system, which consisting of 10 sets laser irradiation systems with 1KJ single  
pulse energy, 1Hz frequency and 0.6m transmitting aperture, through  
continuous driving for a long time by approach and accompanying fly, is  
analyzed and calculated. Through a triangulation three-dimensional  
reconstruction calculation method, the dynamic behavior of the asteroid under  
the laser irradiation drive is studied, and the influence law of the shape and  
rotation of it on the laser driving impulse and the influence of laser driving on its  
attitude and the rotation state are analyzed. Then taking seven of the most  
threatening asteroids as objects, the deflection defense effect of laser array  

defense system is calculated. The results show that the space-based laser drive system can effectively deflect these asteroids with sufficient warning time. This paper provides a useful reference for the research on the technique of space based laser deflecting to prevent asteroids from striking the earth.