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CONTACT DYNAMICS OF NET CAPTURING OF SPACE DEBRIS

Abstract

Net capturing method has been proposed to mitigate the collision risk on satellites by space debris. The mass-spring model, which is usually applied as net model, has a limitation in describing the contact between a net and a target because that the fictitious penetration of the mass-less spring into the target cannot be avoided. In this paper, the absolute nodal coordinates formulation (ANCF) is applied to model the net. The ANCF model is able to describe the flexibility of the net, and the penetration of the cables into the target can be overcome. The analysis of the contact dynamics between the net and the target based on ANCF is presented for the first time. The characteristics and benefits of ANCF are described and analysed. A drawback of the ANCF over the mass-spring model was found to be its inferior computational performance.