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Interactive Presentations - IAF ASTRODYNAMICS SYMPOSIUM (IP)

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TERRESTRIAL SHADOW REPRODUCTION FOR DESIRED ACCURACY ON ORBIT  
PROPAGATION**Abstract**

This paper discusses the relations between desired propagation accuracy and terrestrial shadow. The recent interests of researchers in orbit propagators would be classified into two types. One, which is general, focuses on the compatibility of accuracy and computational efficiency and, the other, which is practical, is on the trade-off of a propagator configuration based on its specific application. In terms of a configuration on perturbations, there already exists several discussions how precise calculations, e.g. Earth's gravitational potential and coordinate transformations, should be performed to fully achieve desired accuracy. On the other hand, few findings regarding solar radiation pressure (SRP) are observed, whereas SRP is obviously critical to objects featured with high altitude and area-to-mass ratio. This paper, therefore, investigates and reveals the relationship. Thinking of SRP from this point of view, the issue which should be made is the relation of objects' experiences of terrestrial shadow and propagation results on simulation. With some propagator configurations, for instance, penumbra never be passed due to the time step-size even if it is considered. Detailed shadow models cause computational burden. Thus, those knowledges are significant whenever requiring moderate or high accuracy. To reach the ultimate issue, this paper begins with exploring the models of SRP under shined and terrestrial shadow purely, since there are several models of them. This paper, then, reveals how truly the shadowed experiences should be reproduced to obtain desired accuracy on simulations. The attractions to potentials of space, which have been turning themselves into the realization of space development concepts, have been and will be leading the increase of orbiting objects. In such a context, this paper contributes both the development and management.