PDC2023
Vienna, Austria

Deflection / Disruption Modeling & Testing

NUMERICAL MODELS OF MITIGATION OPTIONS FOR HYPOTHETICAL THREAT OBJECT 2023 PDC

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Keywords: *Mitigation, deflection, nuclear*

ABSTRACT

We present the results of numerical simulations of nuclear mitigation options for the hypothetical threat object 2023 PDC, based on Epoch 1 scenario inject released on the CNEOS website. According to the information in this epoch, the threat object is discovered on 10 January 2023, and the predicted impact date is 22 October 2036. The estimated diameter is 220-660 m, with a median size of 470 m. The worst-case scenario orbit provided is challenging for kinetic impactors, potentially requiring multiple launches per attempt. Nuclear explosive devices may be an important alternative in such cases, permitting a comparable amount of energy to be delivered in one launch vehicle, and delivered flexibly in either a mitigation or disruption attempt. In this study, we use the FLAG (Burton, 1992) and RAGE (Gittings, 2008) hydrocodes and SESAME EOS database (Johnson, 1994) developed at Los Alamos National Laboratory to simulate the response of the threat object to nuclear explosive devices of different yields at different stand-off distances, and document options that could be viably delivered under this scenario's launch constraints.