

SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (2)

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INTEGRATED END-TO-END NEO THREAT MITIGATION SOFTWARE SUITE

Abstract

Nowadays, there are a number of institutions worldwide that contribute to the discovery, tracking, identification, cataloguing and risk characterisation of NEOs in support to the space situational awareness activities. However, there is not currently an integrated set of tools that cover, in a complete manner, the assessment of the impact risk mitigation actions that can be taken to prevent the impact of a NEO on Earth and to allow helping the dimensioning of space missions to address such problem.

Within the European Community FP7 funded project NEOShield it is expected to develop the following set of utilities for such purposes: - NEO Impact Risk Assessment Tool (NIRAT). - NEO Deflection Evaluation Tool (NEODET). - Risk Mitigation Strategies Evaluation Tool (RIMISET).

NIRAT allows evaluating, for possible impactors, the projection of the collision risk at the dates of future possible impact. This tool characterises the impact probability for the different opportunities and, together with the knowledge of the asteroid features, the evaluation of the risk. This tool resembles current performances achieved by NEODYs and Sentry, but does not pursue the same level of accuracy.

The second tool, NEODET, allows assessing the required optimal mitigation change in asteroid velocity at any given instant prior to the possible Earth impact epoch. This would represent the effect of impulsive mitigation options (one or several impacts). It shall also allow evaluating the accumulated effect that slow-push techniques (e.g. gravity tractor) should impose on the asteroid orbit to achieve optimal deflection.

Finally, the RIMISET tool shall allow evaluating how each of the possible impulsive and slow-push mitigation techniques would meet the required changes in asteroid state to obtain the searched for deflection and the requirements that this could impose on the design of the mitigation mission. Each technological solution would be simulated to allow ascertaining the efficiency in achieving the goal deflection by any of the proposed means (impact, explosive, gravity tractor and possible combinations of those). Ultimately, it shall serve to dimension the required mitigation space systems and solutions.

NIRAT and NEODET are already developed and RIMISET will be finalised by the time of the Conference. Design solutions and results from the three tools will be presented at the Conference. A test case over asteroid 2011AG5, which was at the centre of the scientific community interest during last months, has been already executed with NIRAT and NEODET.