Optimal Disruption/Fragmentation of Hazardous Asteroids with Short Warning Time

ABSTRACT
Despite the lack of a known immediate impact threat from an asteroid or comet, historical scientific evidence suggests that the potential for a major catastrophe created by an asteroid or comet impacting Earth is very real, and humankind must be prepared for it. Due to the recent Chelyabinsk meteor event that occurred in Russia on February 15, 2013 and a close encounter by asteroid 2012 DA14 (now named as 367943 Duende) on the same day, there is now a further growing national and international interest in developing a global plan to protect the Earth from a catastrophic impact by a hazardous asteroid or comet. As a result, on June 18, 2013, NASA announced an Asteroid Grand Challenge on finding all asteroid threats to human populations and knowing what to do about them. This talk will present an innovative yet practical solution to the technically challenging problem of mitigating the impact threat of an asteroid or comet in a collision course with Earth, especially with short warning time (< 5 years). A Hypervelocity Asteroid Intercept Vehicle (HAIV) concept is being developed for NASA’s Innovative Advanced Concepts (NIAC) Phase 2 Study. The HAIV system consists of a leading hypervelocity kinetic impactor and a trailing body carrying nuclear explosives. Various technical issues associated with practical implementation of the proposed HAIV concept will be discussed.

BIO
Bong Wie is the Vance Coffman Endowed Chair Professor of Aerospace Engineering and the founding Director of the Asteroid Deflection Research Center at Iowa State University (http://www.adrc.iastate.edu). He received his B.S. degree in Aerospace Engineering from Seoul National University in 1975 and his M.S. and Ph.D. degrees in Aeronautics and Astronautics from Stanford University, in 1978 and 1981, respectively. In 2006, the AIAA presented Professor Wie with the Mechanics and Control of Flight Award for his innovative research on advanced control of complex spacecraft such as agile imaging satellites equipped with CMGs, solar sails, and large space structures. He is the author of an AIAA textbook Space Vehicle Dynamics and Control (second edition, 2008). His current research is focused on developing the complete set of innovative yet practical solutions for mitigating the impact threat of hazardous near-Earth objects through a NIAC (NASA Innovative Advanced Concepts) Phase 2 study.