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Juventas/HERA CubeSat landing and Surface Operations on asteroid
Dimorphos

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ABSTRACT

The Hera mission will launch in 2024 and explore binary asteroid Didymos after the kinetic impact of the DART spacecraft. HERA carries two 6U CubeSats, one of which is the Juventas CubeSat developed by GomSpace Luxembourg with the Royal Observatory of Belgium as principal investigator. The spacecraft will attempt to characterize the internal structure of Didymos's secondary body, Dimorphos, over a period of roughly 2 months using a low-frequency radar. Afterwards, it will attempt a ballistic landing on Dimorphos, during which the spacecraft is expected to perform several bounces. Juventas is equipped with high-rate accelerometers and gyros with which it aims to characterize the interactions with Dimorphos's surface. Once landed, Juventas will also use its gravimeter to obtain in-situ measurements of the surface acceleration on Dimorphos along two of its orbits around the primary body.

In this study, we present the current landing strategy, trajectory with bounces as well as the surface operation of Juventas on Dimorphos. During landing, Juventas will use its GNC system to assure a safe landing. The interaction of spacecraft with the asteroid surface during the landing and bouncing process, including effect of spacecraft solar array wings, will be discussed. Once settled on the surface, the surface operation will be initiated with the gravimeter making measurements for at least one Dimorphos orbit.
