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Facilities and Operations of Microgravity Experiments (5)

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A POTENTIAL NEW MICROGRAVITY PLATFORM FOR EXPERIMENTATIONS: THE ARIANE 6
THIRD STAGE**Abstract**

Scientific research in microgravity covers a large variety of disciplines, thus allowing to understand the effects of weightlessness on some basic processes, giving a better understanding of their nature and leading to technological improvements. Today there are different microgravity platforms used to perform experiments. In Europe, sounding rockets, drop tower and parabolic flights aircrafts are currently available for such experiments. However, Maxus, the largest sounding rocket, is also the most expensive platform, and the duration of microgravity in parabolic flights is not convenient for some specific fields of research (e.g. foam study, some granular matter, etc.). In addition, the Russian orbital capsule Foton, which provided an optimal setup for microgravity experiments, is out of commission. This leads to an open market for a vehicle offering a microgravity phase lasting more than 15 minutes. Among all the possibilities, the third stage of Ariane 6 (the next generation European heavy launcher) could be used as a new microgravity platform. In fact, as most of the launching systems, Ariane 6 is oversized for most of satellite payload and thus offers resources (volume and weight) for secondary payload(s). Moreover, after the release of the main payloads, the third stage may offer an interesting level of microgravity for 15 – 30 minutes. This paper provides a feasibility study of microgravity services on board Ariane 6 third stage, which results from a critical analysis of the advantages and disadvantages of the eventual implementation of such platform, together with some key elements of a business case. It includes a technical description of Ariane 6 rocket for this use and a list of possible experiments to perform on board of its third stage, together with a comparison with other existing microgravity platforms.