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MIGROP - PARABOLIC FLIGHT WITH LIGHT AIRCRAFT - A NEW PLATFORM FOR ZERO-G, PARTIAL-G AND HYPER-G EXPERIMENTS

Abstract

Parabolic flight is well known as test platform for experiments under zero-g conditions. NASA and ESA offer zero-g opportunities with their large aircrafts (Boeing, Airbus). This is an important part for the zero-g research especially when a person needs to observe and control the experiment, which is not possible in drop tower facilities or sounding rockets. The main advantage of a large aircraft is the long zero-g duration and the high payload capacity. A smaller aircraft shows shorter zero-g duration and a smaller payload capacity. The big advantages of smaller aircraft are the reduced centrifugal acceleration levels, the bigger flexibility in terms of flight scheduling and consideration of individual customer needs, the possibility to perform hundreds of parabolas within a short period - and finally a very competitive price calculation. Due to the reduced effort for preparing flight campaigns which carry single experiment teams (compared to the many team campaigns of ESA or NASA), the lead time for the customer is drastically reduced and the corresponding flexible scheduling can meet the customers' demands in a very comfortable way. If needed, the aircraft can even fly to an airfield near the customer for a rather low rate. Parabolic flight with smaller aircraft will be a fruitful addition to the already existing facilities. The concept is to offer opportunities to perform experiments and pre-test campaigns for drop tower campaigns and other zero-g campaigns in order to increase the overall efficiency and to open the door for research, development and education for a broader target group. In the end all providers of zero-g will benefit from this concept. Another advantage is the possibility to create partial-g (Moon, Mars, etc.) and hyper-g conditions (up to 2 g with a very small gradient) following individual demands. The experiment duration depends on the mode (7.5-12 seconds for zero-g and partial-g, minutes for hyper-g). A team of pilots, scientists and engineers develops new zero-g (partial-g, hyper-g) flight opportunities with light aircraft < 5.7t that show the mentioned advantages. In 2018 first test flights have been carried out with a CT206H aircraft which shows a better flight performance compared to the type used for previous tests. The payload capacity is around 150kg plus 1-2 people for experiment control. This contribution gives a detailed overview on the project concept as well as technical details.