

Solar human powered airships as small airship feeders

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ABSTRACT

Solar power and Airship technology has become most popular now a days. They provide cost effective alternatives. They are also used for various commercial transportation purposes. Airships of today's technology are mainly used for tourism and cargo transport purpose. This study gives a detail about how "Solar-human powered airships" can be used as "small airships", based on the conceptual design and implementation of hybrid airships for personal flying purposes. The feeder concept is part of the Multibody Advanced Airship for Transport also known as MAAT. MAAT consist of a cruiser that is the main airship and feeders which are smaller airships. Feeders can fly individually and they can join the cruiser. The idea of MAAT is similar to the land transport. If there are two cruisers which are heading to different destinations, they can exchange feeders, if required, in the air and then each travel to a different destination. Cruisers also don't land. Instead the feeders land for loading and unloading cargo and boarding passengers. This research studies the optimization of the size and power of an airship to be used only for few passengers which can be used also as a feeder of MAAT concept. Various possible sources of energy including human power and solar are considered.

Both Helium and Hydrogen gases are used for providing the buoyancy within the size and shape of the Airship balloons of conventional and unconventional type. CFD Simulation is performed to find the airflow around the airship to estimate the drag with the help of StarCCM+. Using the drag estimation power required for an airship and also the thrust required to overcome the drag are calculated. Propellers are chosen according to the thrust requirements with the help of wake propulsion having propellers at rear end of the cabin. An electric motor is considered for propulsion system. Thin film solar photovoltaic cells are considered to fix on the surface of the

Airship for receiving the solar energy from different directions. Solar energy that can be stored and used for flying is estimated. Human power is estimated with the help of a bike test. Li ion Batteries are taken into consideration as a power storage device. Comparison of conventional and unconventional shapes of Airships has been performed in various aspects like Drag coefficient, Frontal Area, Power required by motors and the Torque applied to propeller for same volume.