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Author: Ms. Neus Lladó
Elecnor Deimos, Spain, neus.llado@elecno-deimos.com

Dr. Alexander Bormann
Aeroix, Germany, a.bormann@aeroix.de

Mr. Josep M Llado
Ultramagic, Spain, jm@ultramagic.com

Dr. Ed Chester

CTAE - Aerospace Research and Technology Centre, Spain, (*email is not specified*)

ADVANCED MATERIALS FOR BALLOON MISSIONS TO OTHER PLANETS

Abstract

Having succeeded in the development of a new insulation fabric for balloons in Earth atmosphere it is time to extend it to other atmospheres.

With just a single layer of the Aerofabrix™ insulation the fuel consumption of a balloon is reduced more than a half. The insulation induces extra cost and manufacturing effort, which is compensated by lower consumption and the substitution of the fuel by the payload.

A balloon has the main advantage that it floats inside the atmosphere and it can measure directly atmospheric science and ground observation.

Exploration of other planets is still a priority, and a challenging area of study.

On some planets the extreme environment conditions can be very similar and the Aerofabrix™ insulation could be used.

In this paper, the Venus atmosphere will be compared to the Earth atmosphere and we study the possible application of this insulation. The excellent insulation quality of $\Lambda = 0,0265 \text{ W/mK}$ in atmospheric conditions, a density of less than 7 kg/m^3 together with the extreme reversible compressibility down to 15 per cent of its initial volume and the easiness to fold up the material can have a utility in space conditions.

This paper will present the results of the new insulation for a balloon and a study of possible applications of the Aerofabrix™ insulation in space.