

Technological Ensuring of the Space Reflector Antennas Manufacturing Process from Carbon Fiber Reinforced Plastics

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Abstract : In the study, the calculations of the permeability coefficient, values of the volume and porosity of a unit cell of a woven fabric before and after deformation based on the geometrical parameters are presented. Two types of carbon woven fabric structures were investigated: standard type, which integrated the filament, has a cross sectional shape of a cylinder and spread tow type, which has a rectangular cross sectional shape. The space antennas reflector, which distinctive feature is the presence of the surface of double curvature, is considered as the object of the research. Modeling of the kinetics of the process of impregnation of the reflector for the two types of carbon fabric's unit cell structures was performed using software RAM-RTM. This work also investigated the influence of the grid angle between warp and welt of the unit cell on the duration of impregnation process. The results showed that decreasing the angle between warp and welt of the unit cell, the decreasing of the permeability values were occurred. Based on the results of calculation samples of the reflectors, their quality was determined. The comparisons of the theoretical and experimental results have been carried out. Comparison of the two textile structures (standard and spread tow) showed that the standard textiles with circular cross section were impregnated faster than spread tows, which have a rectangular cross section.

Keywords : vacuum assistant resin infusion, impregnation time, shear angle, reflector and modeling

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