DESIGN AND STUDY FOR FILAMENT WOUND COMPOSITE PRESSURE VESSELS

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ABSTRACT

FILAMENT-WOUND COMPOSITE PRESSURE VESSELS HAVE BEEN WIDELY EMPLOYED IN THE COMMERCIAL AN -D AEROSPACE INDUSTRIES SUCH AS FUEL TANKS, PORTABLE OXYGEN STORAGE,ROCKET MOTOR CASES AND SO ON. AMONG THE MERITS OF SUCH COMPOSITE PRESSURE VESSELS ARE HIGH SPECIFIC STRENGTH,HIGH SPECIFIC STIFFNESS, LIGHTWEIGHT AND EXCELLENT CORROSION RESISTANCE. HOWEVER, THE PROBLEMS DURING MANUFACTURING ARE THE SLIPPAGE OF WINDING BAND ON THE FILAMENT WOUND DOMES. TO EFFEC -TIVELY MANUFACTURE THE FILAMENT-WOUND COMPOSITE PRESSURE VESSELS, PREDICTING DOME CONTOUR AND SLIPPAGE TENDENCY IN RELATION TO CONSIDERATIONS OF DESIGN AND SAFETY IS A RELEVANT TASK .FOR THE PREDICTION OF THE SLIPPAGE TENDENCY ATTRIBUTED TO FILAMENT WINDING PATTERNS,THE SL -IP CALCULATIONS ARE PERFORMED ONLY FOR THE CENTERLINE OF THE WINDING BAND IN PREVIOUS INVE -STIGATIONS. EFFECTS OF THE WIDTH OF THE WINDING BAND ON THE STABILITY OF THE WINDING PATTE -RN IN THE DOMEHAVE NOT BEEN STUDIED.THE OBJECT OF THIS STUDY IS TO CONSIDER THE EFFECTS OF THE WIDE WINDING BANDWIDTH ON THE STABILITY OF THE WINDING PATTERN. FURTHERMORE,THE OPTIMAL DESIGN OF DOME CONTOUR FOR FILAMENT-WOUND COMPOSITE PRESSURE VESSELS,WHICH CONSIDERS BOTH W -INDING STABILITY AND STRUCTURAL STRENGTH,IS PRESENTED IN THIS STUDY. THE SELECTION OF THE BEST A/B RATIO, WINDING ANGLE AND BANDWIDTH ARE EMPLOYED AS A USEFUL REFERENCE FOR RENEWING THE DOME CONTOUR OF FILAMENT-WOUND COMPOSITE PRESSURE VESSELS DURING THE PRIMARY DESIGN STA GE.

Keywords : PRESSURE VESSELS, WINDING, SLIPPAGE TENDENCY, DOME CONTOUR, BAND WIDTH.

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