

SPACE DEBRIS SYMPOSIUM (A6)
Modelling and Orbit Determination (9)

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OBSERVATION AND ANALYSIS OF THE APPARENT SPIN PERIOD VARIATIONS OF INACTIVE
BOX-WING GEOSYNCHRONOUS RESIDENT SPACE OBJECTS**Abstract**

Ground-based broadband photometric observations of four inactive geosynchronous resident space objects of box-wing design were frequently performed between March 2012 and December 2013 to study their attitude dynamics. Each of these objects was observed to spin with a period that varied in a manner that suggested periodic behaviour. The objects' average apparent spin periods varied greatly from one another, ranging between nearly 160 seconds and nearly 1550 seconds. The apparent spin period variation characteristics, including the amplitudes and apparent shapes, also appeared very different from one another and suggested a relationship between the average apparent spin period and the amplitude of its variation. The observed spin period variations suggested that one or more external disturbance torques were acting on the spacecraft and that the effect appeared to be cyclical. The most influential disturbance torque acting on these objects was determined to be caused by solar radiation pressure acting on the large area solar panels. A cyclical variation of the objects' apparent spin periods suggested that the solar incidence angle on the solar panels was affected not only by the spacecraft spin but also by the Earth's orbit motion around the Sun.