Thermal-Optical Design of a Geodetic Satellite for One Millimeter Accuracy

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The current accuracy goal for geodetic satellites is one millimeter. The existing geodetic satellites do not meet this requirement. The primary problem is that the cube corners are too large. The size does not match the velocity aberration. This requires the use of dihedral angle offsets. The thermal distortion of the diffraction pattern is proportional to some power of the size, approximately the fourth power. One solution is to use a larger number of smaller cubes to meet the cross section requirements. This was not done on LAGEOS for financial reasons. There was no justification since the satellite met the 5 mm accuracy goal with the 1.5 inch cubes. The availability of inexpensive COTS cubes has removed the financial impact of using a large number of small cubes. Testing of the COTS cubes shows they meet the optical specifications. Using a large number of 1.0 inch COTS cubes produces a transfer function that meets the cross section and accuracy requirements.