Title:	QUATERNION BASED REFINEMENT MODEL FOR HIGH-RESOLUTION SATELLITE IMAGES
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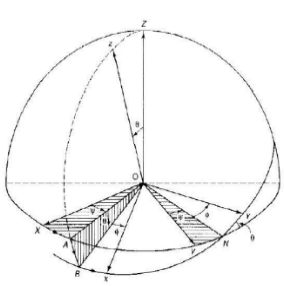
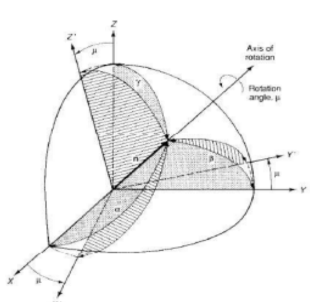
Abstract: An important facility now available to users of imaging satellites is the ability to compute the precise location of points on the ground from the location of their images in satellite captured imagery. Indeed, this is now a significant commercial product sold by satellite operators to the public. However, this data product generated suffers from geometric inaccuracy due to various geometric distortions arising out of orbit, attitude variation, earth rotation, limited accuracy of sensor parameter measurements. Various mathematical models have been developed to account for the errors in order to improve accuracy to an acceptable limit. Currently, a polynomial error model is being used for Euler angles in which errors in roll, pitch, yaw are assumed to follow a polynomial behaviour. The collinearity model serves as a base to calculate the ground coordinates for a given image point. The collinearity equation is expanded using the Taylor series expansion and the unknown coefficients of the polynomial for the modelled roll, pitch, and yaw values, or the four parameters of quaternions are computed using the Ground Control Points (GCP) as a reference. The Least square method is used for the calculation of the coefficients which give the best approximation of the actual parameters. In this thesis, an alternative approach has been developed to improve the accuracy using refinement of quaternions. A quaternion consists of a vector, which defines the axis of rotation, and a scalar, which determines the amount of rotation. The conventional image to ground model is used to evaluate the performance of this approach. Promising results are obtained using this and the accuracies achieved are comparable to existing model using roll, pitch and yaw. Slerp interpolation method is used for interpolating the intermediate values of quaternions. Also, we have calculated the values of latitude and longitudes using Direct Linear Transformation Algorithm. We have used CORDIC for the calculations of trigonometric functions which makes the algorithm faster.





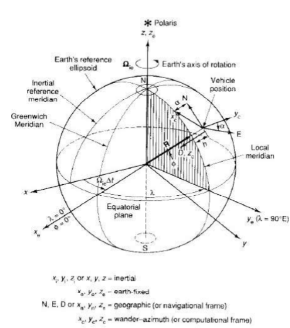


Figure 2.1: Co-ordinate Frame[2]