

Satellite Photogrammetry Topics -- Spring 2016

motivation for mirror optics: chromatic aberration, weight
 on-axis vs. off-axis telescope design
 history of satellite remote sensing
 synchronous vs. asynchronous scanning
 digital globe: worldview 1
 reference coordinate systems
 coordinate transformations
 (1) phi, lambda, h -> cartesian, ECF, closed form
 (2) ECF -> phi, lambda, h, iterative
 (3) ECF -> local cartesian (topocentric)
 support data: .geo, .imd, .rpb, .eph, .att
 rotation parameters:
 (1) euler angles (roll, pitch, yaw), singularities
 (2) direction cosines
 (3) quaternions
 (4) axis-angle
 image to ground algorithm
 systematic errors:
 (1) atmospheric refraction
 (2) velocity aberration
 matlab functions needed:
 (1) [X;Y;Z]'=FI2G(1,s,h)
 (2) [PHI; LAM]'=FI2G_PL(1,s,h), just a wrapper
 (3) [dPHI; dLAM]'=FI2G_PL_0(1,s,h,phi,lam), just a wrapper
 (4) [l;s]=FG2I(phi,lambda,h), solve eqn (3) for l,s by iteration
 verify that (2) & (4) are inverses
 adjustable parameters
 resection (refine EO given GCP's)
 2-image triangulation with tie points and GCP's
 replacement model
 standards for replacement model parameters
 coordinate normalization
 solving singular NE
 verify accuracy
 setup stereo model in LPS
 image interpolation
 nearest neighbor
 bilinear
 bicubic
 image pyramid
 orthorectification
 integrate with vectors in ArcGIS
 radiometric units
 radiometry, radiometric design
 resolution, resolving power
 mission design
 CCD operation

 (probably not time for all these topics, maybe some)
 orbit mechanics, 2-body problem
 transformation state vector <-> kepler elements
 time concepts solar, sidereal, ut1, utc, tai, gps, gast, JD, MJD
 transformation ECF <-> ECI, precession, nutation, GAST, polar motion
 velocity transformation
 circular error derivation
 SIFT tie point generation for triangulation
 OpenGL quad buffered & anaglyph stereo