

CE 603 - Spring 2006 - Homework 1

Design a 2m GSD satellite camera for the panchromatic (visible) wavelengths. Assume polar orbit. Use the Kodak KLI-5001 linear array, collect a 5k x 20k (10km x 40km) scene by scanning east-west. Make sure that you can do same pass stereo with $B/H = 0.6$. Max slew rate = 3 deg/sec. Make a recommendation for altitude, aperture size, focal length, line rate, scanning angular velocity, *Show all supporting and intermediate steps. Give a reference or show derivation for all constants.* Evaluate consistency of sampling and diffraction limit, assuming high quality optics. If you quantize to 10 bits, and compress by factor of 4, how much data does one stereo pair generate? At 200 Mbit/sec how long does it take to transmit a stereo pair to the ground? If satellite position is known to 1m (sigma) in all three coordinates, and camera attitude is known to 10 arc seconds (sigma), for a terrestrial point of known elevation, what is the planimetric position uncertainty at nadir, and at 10,20,30 degrees off-nadir?

Brightest normal scene elements should produce 90% of the detector saturation level. See Kodak.com for linear array specs. Minimum altitude 400km, try to minimize the aperture size.

Assigned Monday, 23-Jan, due Friday, 3-Feb.