



NISAR High Resolution Wide Swath Imaging with Digital Beam Forming

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The Indian Space Research Organisation (ISRO) and the National Aeronautics and Space Administration (NASA) have embarked on a mission for joint realization of SAR in L-band and S-band which will map earth's surface every 12 days. This mission called NASA-ISRO Synthetic Aperture Radar (NISAR) is based on a novel SweepSAR concept. Towards the realization of NISAR payload ISRO is responsible for the development of S-Band SAR system while JPL/NASA will be providing the L-Band SAR system along with data recorder and GPS system. Both radars will share a common antenna reflector (12meters) provided by JPL/NASA. The S-Band SAR instrument is based on an innovative SweepSAR technique [1]. Wide swath in classical SAR technologies flown earlier is achieved by compromising resolution while NISAR is a reflector based SAR with digital beam former on receive. Digital Beam Forming (DBF) [2] [3] which ensures very wide swath measurements (>240 km) with very high resolution (5-10m). This futuristic SweepSAR is configured for polarimetric and repeat pass interferometric measurements. During Transmit all the transmitters (T/R Modules) are activated simultaneously to illuminate wide footprint ~240km over the imaging region while on-receive each T/R receive channel is activated one-at-a-time to avoid ambiguities and improve SNR. Receive gain is maximized due to large (12m) reflector antenna resulting in narrow footprint on the imaging region.

This paper provides design and configuration details of S-SAR payload, on-board NISAR Satellite. Operational concept of High Resolution Wide Swath Imaging technique along with Digital Beam Forming concept planned for S-SAR is also discussed here.

Keywords: NISAR, S-SAR, SweepSAR, Digital Beam Forming, Dual Frequency Sweep SAR

References

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