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A Testbed for the Frequency Agile Solar Radiotelescope

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A broadband (1-9 GHz) three-element interferometer is now in operation at Owens Valley Radio Observatory, designed as a testbed for the Frequency Agile Solar Radiotelescope (FASR) project. The FASR Subsystem Testbed (FST) utilizes three of the 1.8 m antennas of the Owens Valley Solar Array (OVSA), whose RF in the range 1-9 GHz is transmitted via optical fiber links, downconverted in the control room to two selectable 4-GHz-wide bands, and fed to an image-rejection downconverter module to provide a tunable 500 MHz instantaneous bandwidth. The 500 MHz subband from each antenna is digitized at 1 GS/s, and stored directly to computer hard disk with a duty cycle of order 1%, for off-line digital correlation and analysis. A typical mode of operation is to digitize 100,000 samples (100 μs) separated by 20 ms. As a testbed for the FASR system, FST provides the opportunity to study the design, calibration and radio frequency interference (RFI) mitigation requirements for FASR. FST is also the first system with the ability to combine Nyquist-limited high time and frequency resolution with the interferometric ability to locate sources.

We present the initial results of solar observations in the decimeter (1-1.5 GHz) range, focusing on three long-lasting solar radio bursts observed during 2006. A wide range of typical flare-associated noise storm features are observed, including spikes, fiber bursts and zebra pattern bursts. Spatial information on these bursts is presented based on the three-element interferometry of the FST at spectrograph-like frequency and time resolution.