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## Design of a Doppler reflectometer based on frequency steering phased array antenna

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KSTAR Doppler reflectometer is designed based on 32-channel frequency steering phased array antenna (FSPAA) operating in X-mode over the entire V-band (50-75 GHz). In the FSPAA system, the microwave radiation angle can be changed quickly without mechanical movement. This is a very attractive advantage in a fusion reactor environments where the plasma fluctuates continuously and the concept of maintenance-free is important. The microwave radiation angle varies as a function of frequency in the FSPAA. Currently, two 8-channel FSPAA prototypes have been manufactured. The performance of the manufactured FSPAAs are experimentally measured. The radiation angle scans over  $\pm 45^\circ$  for frequency changes of several GHz. The angular scan is repeated 9 times across the entire V-band. A prototype of KSTAR Doppler reflectometer is assembled based on a bistatic antenna configuration with the two FSPAAs. The performance of the prototype Doppler reflectometer is tested using a corrugated reflecting wheel.

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