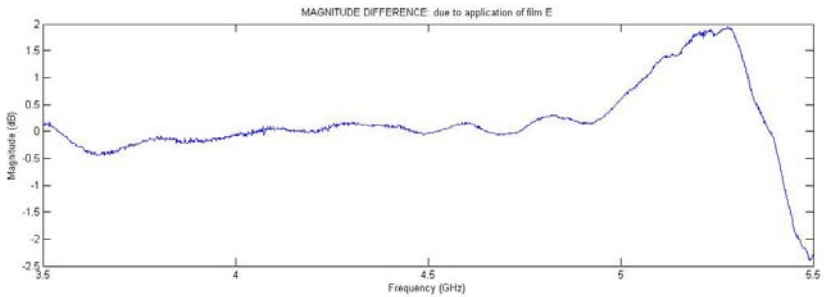
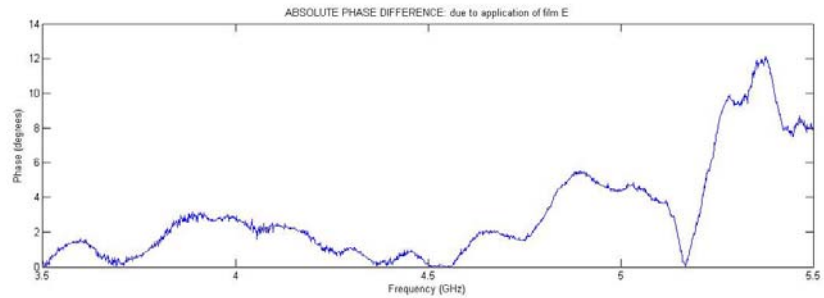
Microwave Detection

Professor Shenda Baker, Harvey Mudd College

When an electromagnetic signal passes through a substance its phase and magnitude are affected. This change in the signal's properties can be used to characterize the substance. Using a Vector Network Analyzer (VNA) the transient or reflected signal can be analyzed.

When a thin film is used as the substance the phase and magnitude will change based upon the dielectric constant of the film and the thickness of the film. Because microwave have a high frequency and a short wavelength they are very well suited to the task of characterizing thin films. The characteristics of microwaves make them more sensitive to variations in thickness and dielectric constant.





Undergraduate Nicholas Evans (HMC) used a VNA and copper striplines to demonstrate the sensitivity of a VNA-stripline system to the change in thickness of a thin film.