

Abstract:

When RF MEMS switches appeared more than 20 years ago, micromechanics has attracted huge attention for enabling near-ideal microwave devices. Since then, MEMS switches and MEMS-switch based circuits went through different development stages and are currently proving themselves commercially, among others for mobile-phone antenna tuners. But micromachining can do much more than "just" MEMS switches for planar transmission-line technology. This talk starts with an overview of the state of the art of RF MEMS, and then shows the potential for 3D silicon micromachining for enabling innovative microwave devices operating up to 110 GHz, including phase shifters, tuneable capacitors and couplers, and near-ideal V-band waveguide switches based on MEMS-tuneable surfaces. Then, the current development of micromachined waveguide systems up to 2.9 THz is given, including a 340 GHz 8-pixel imaging radar system developed at JPL. Finally, the potential of MEMS-tuneable micromachined-waveguide systems is outlined, given the examples of recent work at KTH on THz MEMS devices operating at 500-750 GHz, including a 3.3 bit MEMS phase shifter and a waveguide switch, and ongoing research work on MEMS tuneable filters at submillimeter frequencies is presented.