

Simulation of Oscillations in High Power Klystrons,
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Spurious oscillations can seriously limit a klystron's performance from reaching its design specifications. These are modes with frequencies different from the drive frequency, and have been found to be localized in various regions of the tube. If left unsuppressed, such oscillations can be driven to large amplitudes by the beam. As a result, the main output signal may suffer from amplitude and phase instabilities which lead to pulse shortening or reduction in power generation efficiency, as observed during the testing of the first 150 MW S-band klystron, which was designed and built at SLAC as a part of an international collaboration with DESY. We present efficient methods to identify suspicious modes and then test their possibility of oscillation. The beam loading conductance, which is an indicator for an oscillation is evaluated by tracking particles through the total electromagnetic field. The simulations were performed, using the electromagnetic simulator MAFIA. Results are presented for two oscillating modes, found in the Klystron mentioned above.