PREFACE

Motivated by emerging demand of high frequency transmiting sources for next generation high- resolution imaging radars and high-data rate remote communication systems, extensive research and development activities have been carried out in the area of gyro-TWT. It has a significant characterstic of high power handling capability at higher frequencies which is the need of the hour where its counterpart devices like slow wave and solid state devices failed to fulfill. Besides gyro-TWT has an added advantage that being a gyro device can be operated in the tera hertz gap where LASERs are also proved incompatible.

Though gyro-TWT features high frequency and high bandwidth suits as an ideal source for advanced radar and communication applications has the limitation that its interaction structure is highly susceptible to spurious oscillations. So in order to supress these spurious oscillations an approach of introducing wedge shaped lossy ceramic rods inside the wall of interaction structure is proposed. In the proposed structure beam-wave interaction and backward wave oscillations are analysed. The proposed structure is simulated through CST-PIC simulation tool.

In a highly overmoded gyro-TWT waveguide RF interaction structure, the mode spectrum becomes very dense and electron beam is probable to interact with several nearby modes simultaneously. So a nonlinear time dependent multimode analysis has been presented to investigate the temporal RF interaction behavior of the operating as well as all other competiting modes in the gyro-TWT amplifier.

The author will consider his self-effacing effort a success if it proves to be useful to the community of microwave engineers/scientists.