A low cost microwave detonation velocity measurement system

Since 1960's, microwaves systems are known to be able to measure continuously the detonation front velocity with a very good accuracy. Indeed, high ionized detonation fronts reflect standing electromagnetic waves but with a Doppler shift in frequency generated by the front displacements. This is then post processed to retrieve the front velocity.

First systems used klystron tube as emitter which are not produced anymore. Nowadays, technology developments have replaced these items by Gunn diodes and, more recently, by transistors which can be found in various all-day equipment and thus are very affordable. New and current design of microwave system for detonation front measurement will be addressed.

Moreover, results will show the detonation velocity evolution in a 52mm detonation tube for C3H8+5 O2+x N2 mixtures with varying dilution x from 0 to 3.76. Use of microwave systems in detonation experimental devices is quite simple and they have the great advantage not to be intrusive.