

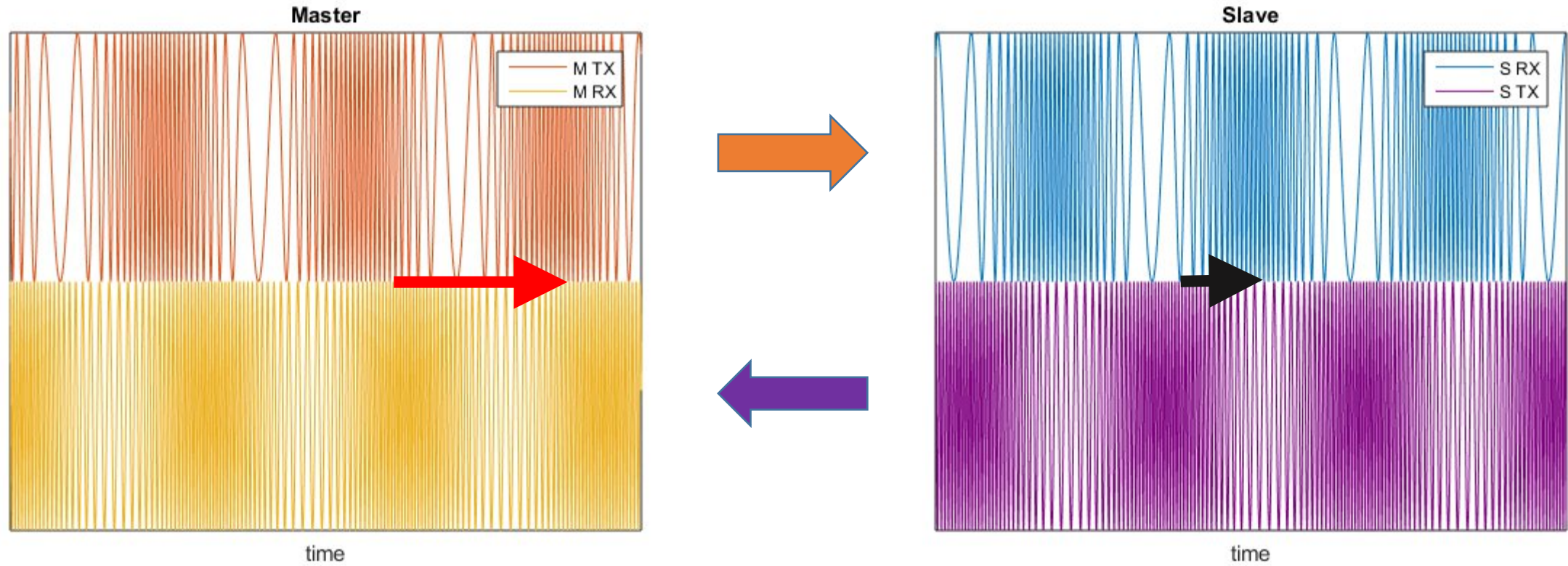
Tellurometer (EDM)

Microwave measurement of distance

How they work

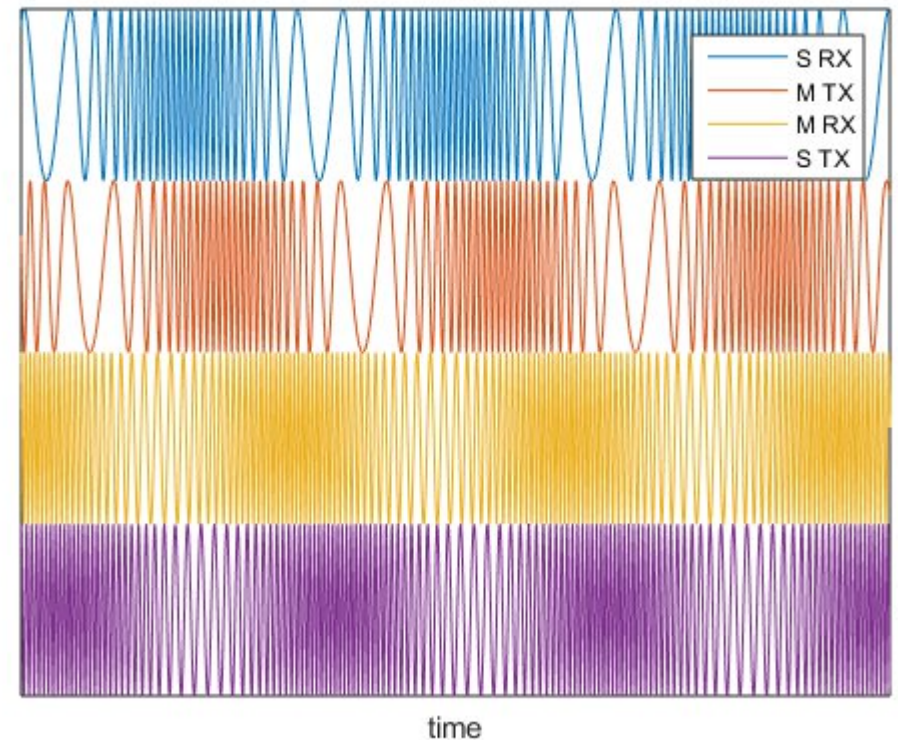
- The slave and master are totally independent units – not synchronized in any way.
- Independent 10GHz carrier (Klystron) frequency modulated independently by slave and master. Think of this a bit like sending pulses of light.
- Slave and Master mix their transmitted and received signals and form an amplitude modulated IF from which they can recover the phase difference between the modulations. Red / Black arrows on diagram.
- On its own this gives no info as the modulations are unsynchronized (and insufficiently stable given technology of the time)

Microwave Measurement of Distance


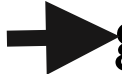


Making measurement at master

- Suppose the slave could send its black arrow phase measurement back to the master though?
- If we put all the graphs together, we see slave RX delayed from slave TX (top two) same amount as master RX delayed from master TX (bottom two)



Subtract the arrows

- Arrow  minus  gives phase angle shift over distance in terms of the Master modulation
- We can recover a distance (up to multiples of the modulation wavelength)
- Change the modulation frequency A,B,C,D,E to read out separate digits of the distance (100km, 10km, ... 10m) and we have a distance measurement between stations
- What might go wrong? Reflections from ground, temperature affecting refractive index.