TCLIA/TCTV broad band transverse impedance

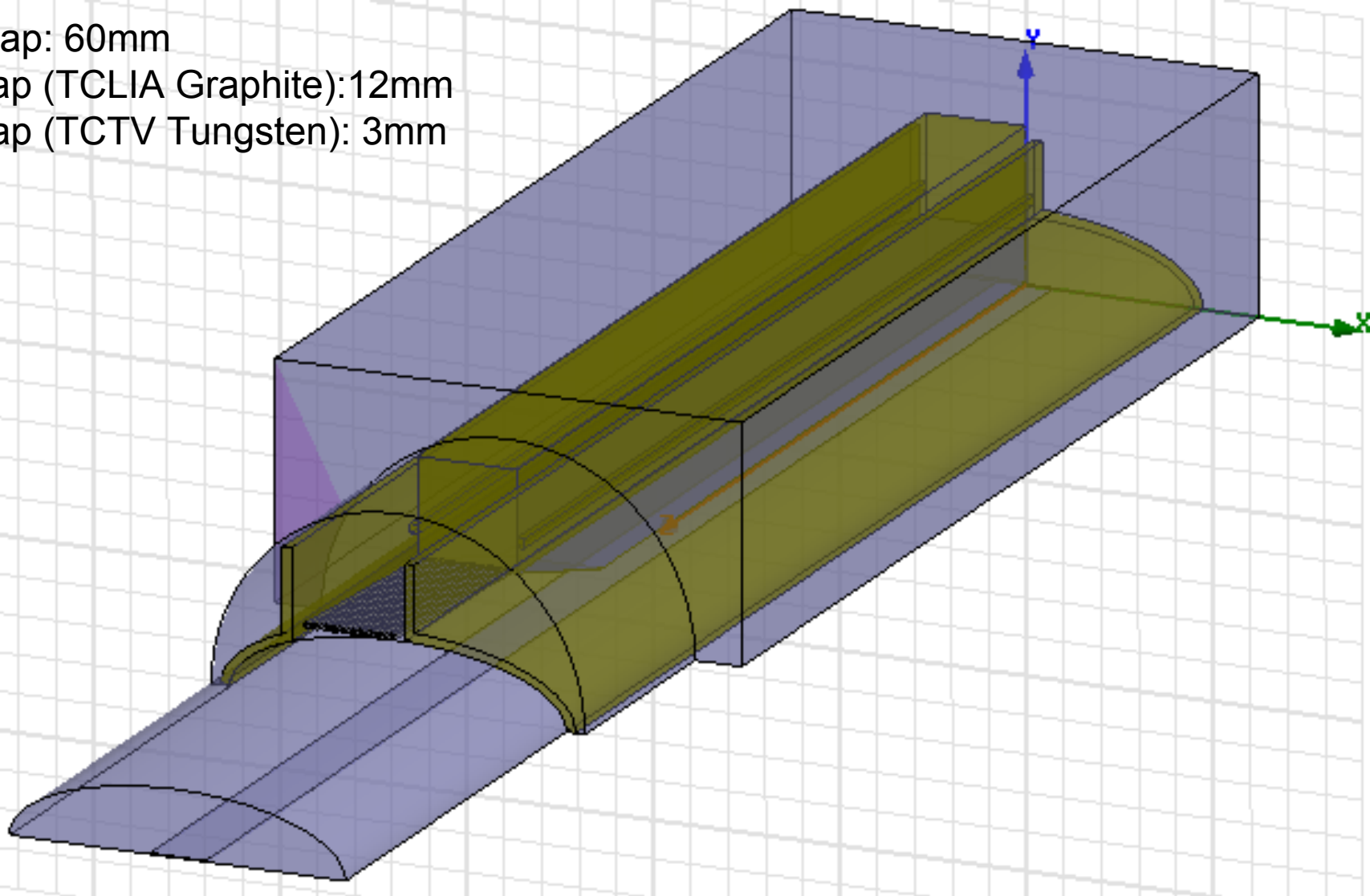
A. Grudiev

17.02.2006

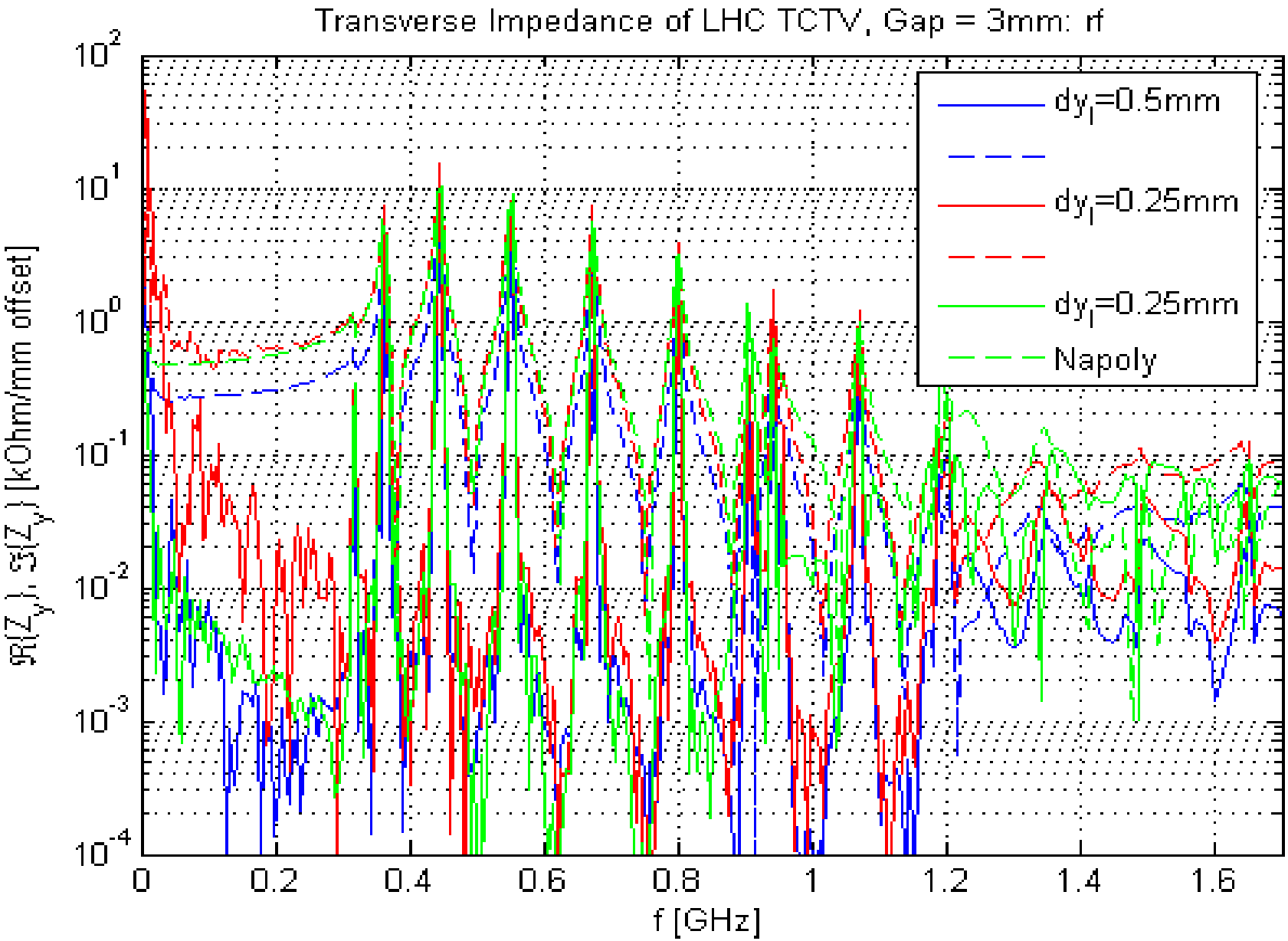
RLC meeting

TCLIA/TCTV geometry

Max gap: 60mm
Min gap (TCLIA Graphite):12mm
Min gap (TCTV Tungsten): 3mm

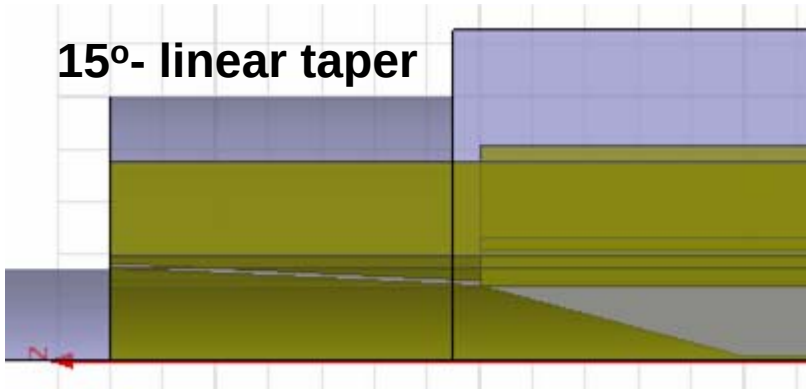


GdfidL results for different mesh and integration algorithms
15^{o}-linear taper

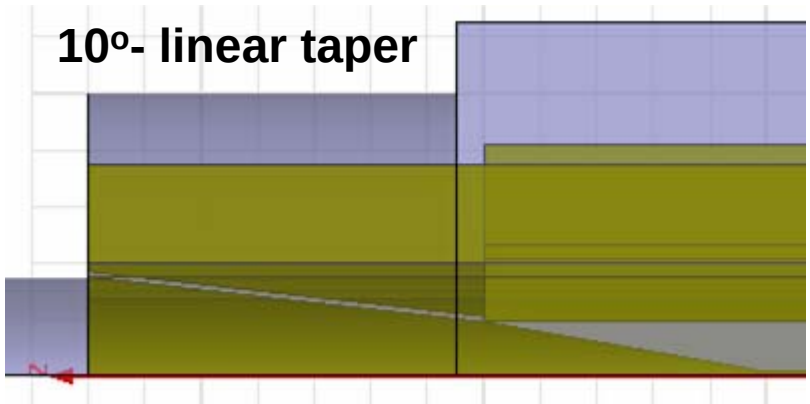


Jaw taper shape optimization

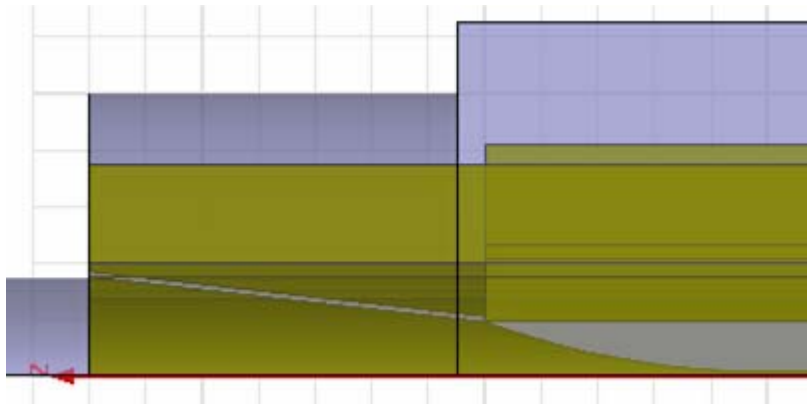
15^{o}- linear taper



10^{o}- linear taper

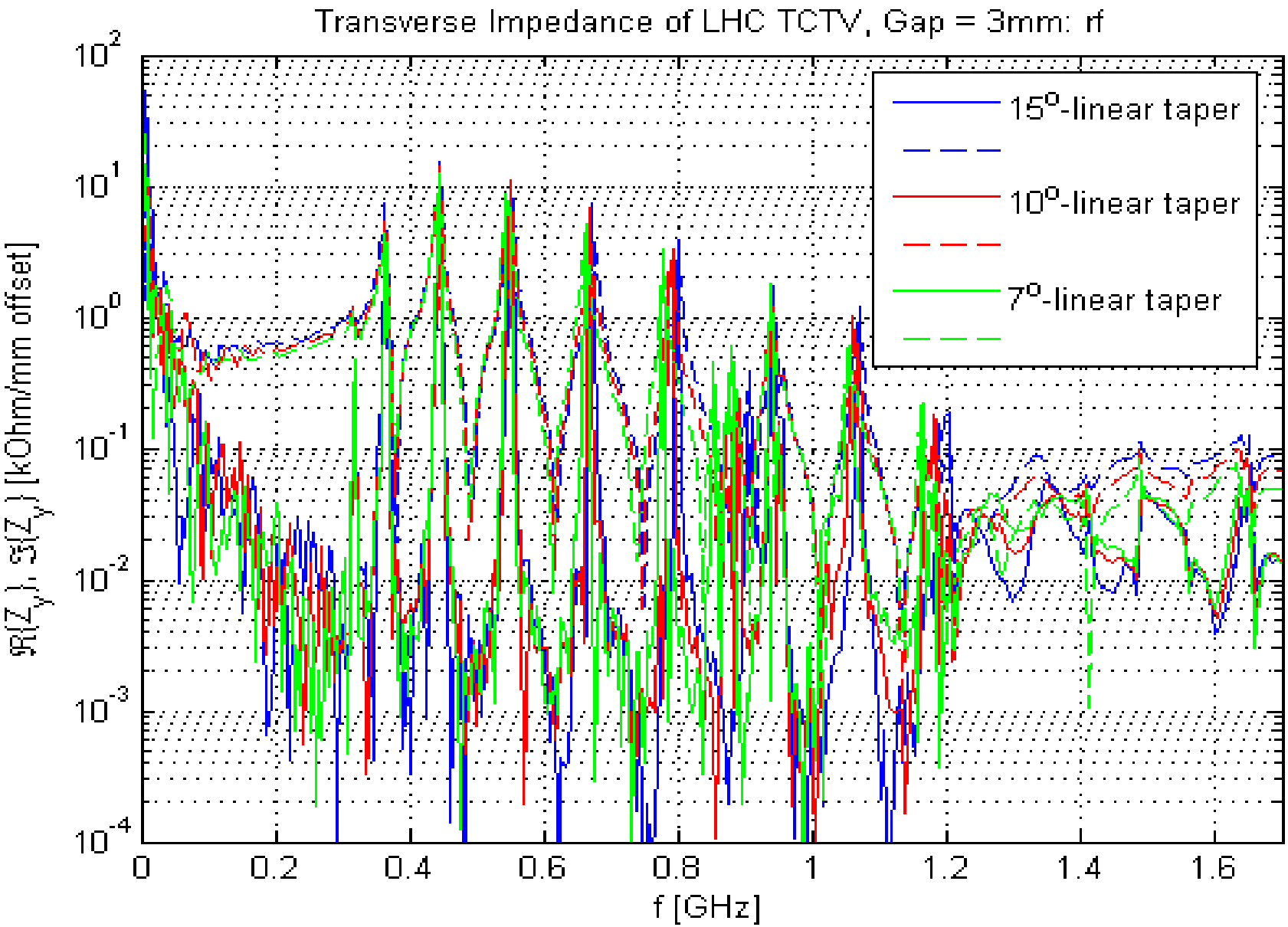


10^{o}- non-linear taper



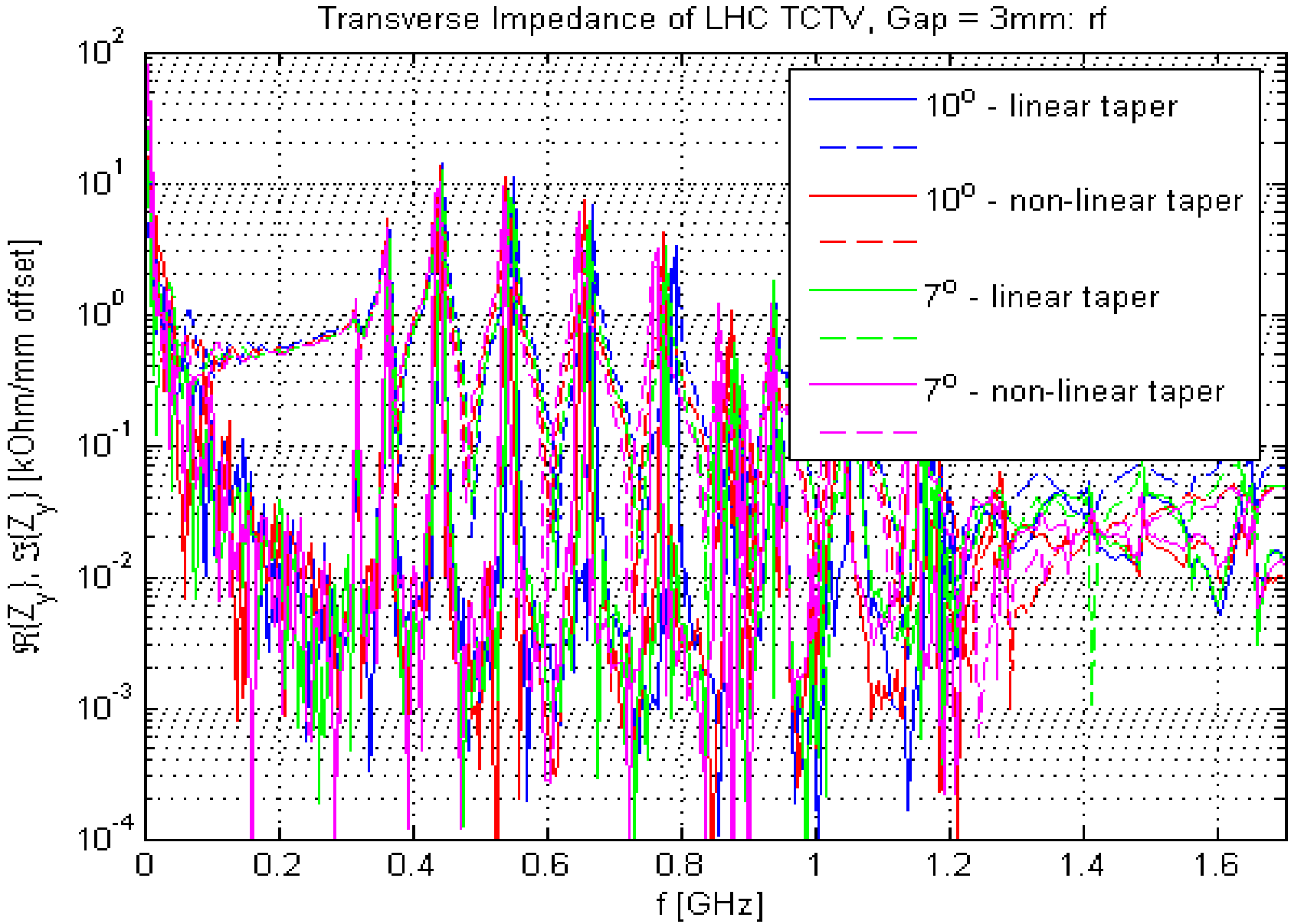
It is not a solution for dipole trapped modes

GdfidL results for different taper angle



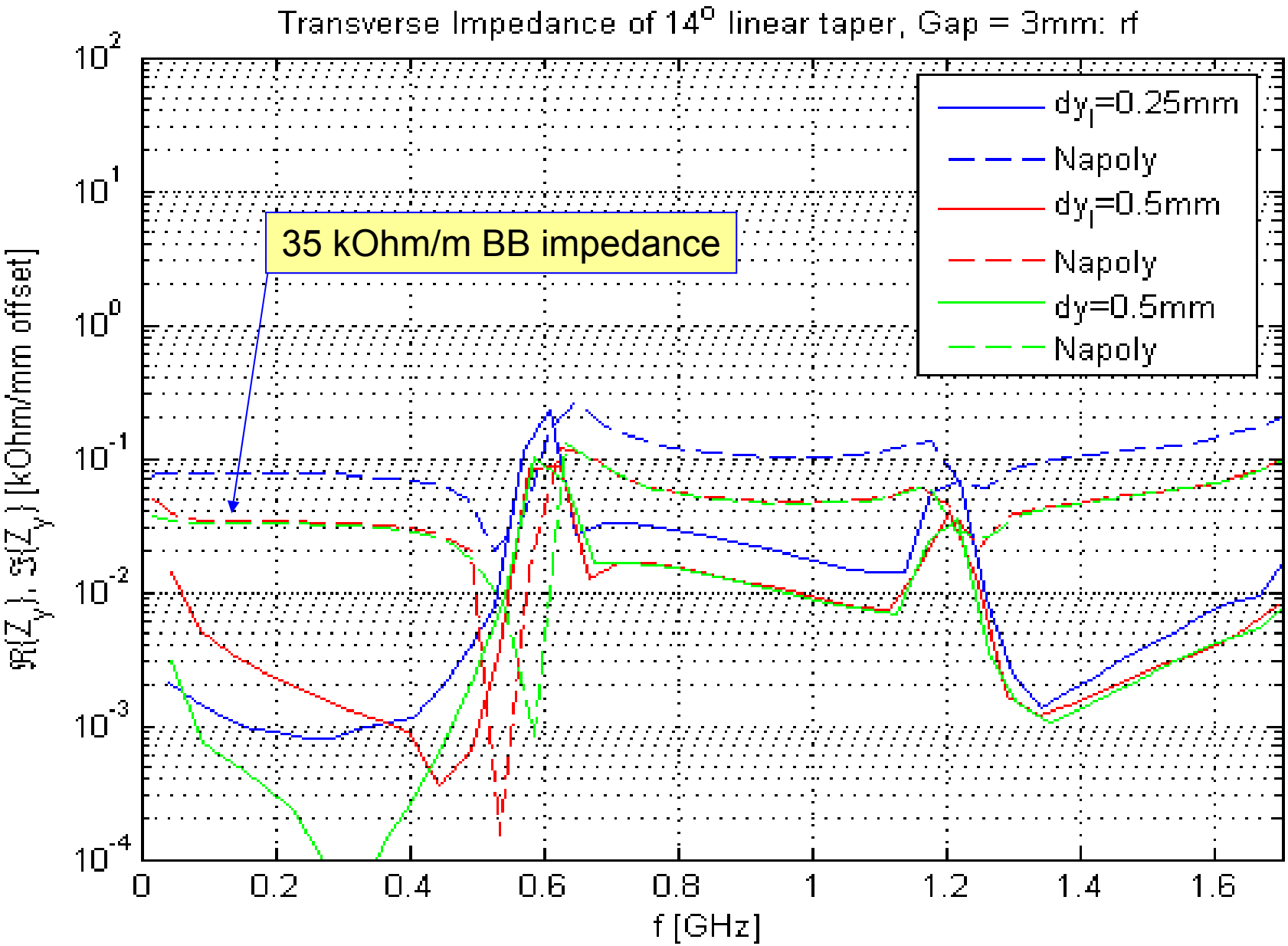
It is not a solution for broad band impedance

GdfidL results for different taper angle and type



It is not a solution for broad band impedance

GdfidL results for 14°-linear taper, parallel plate geometry

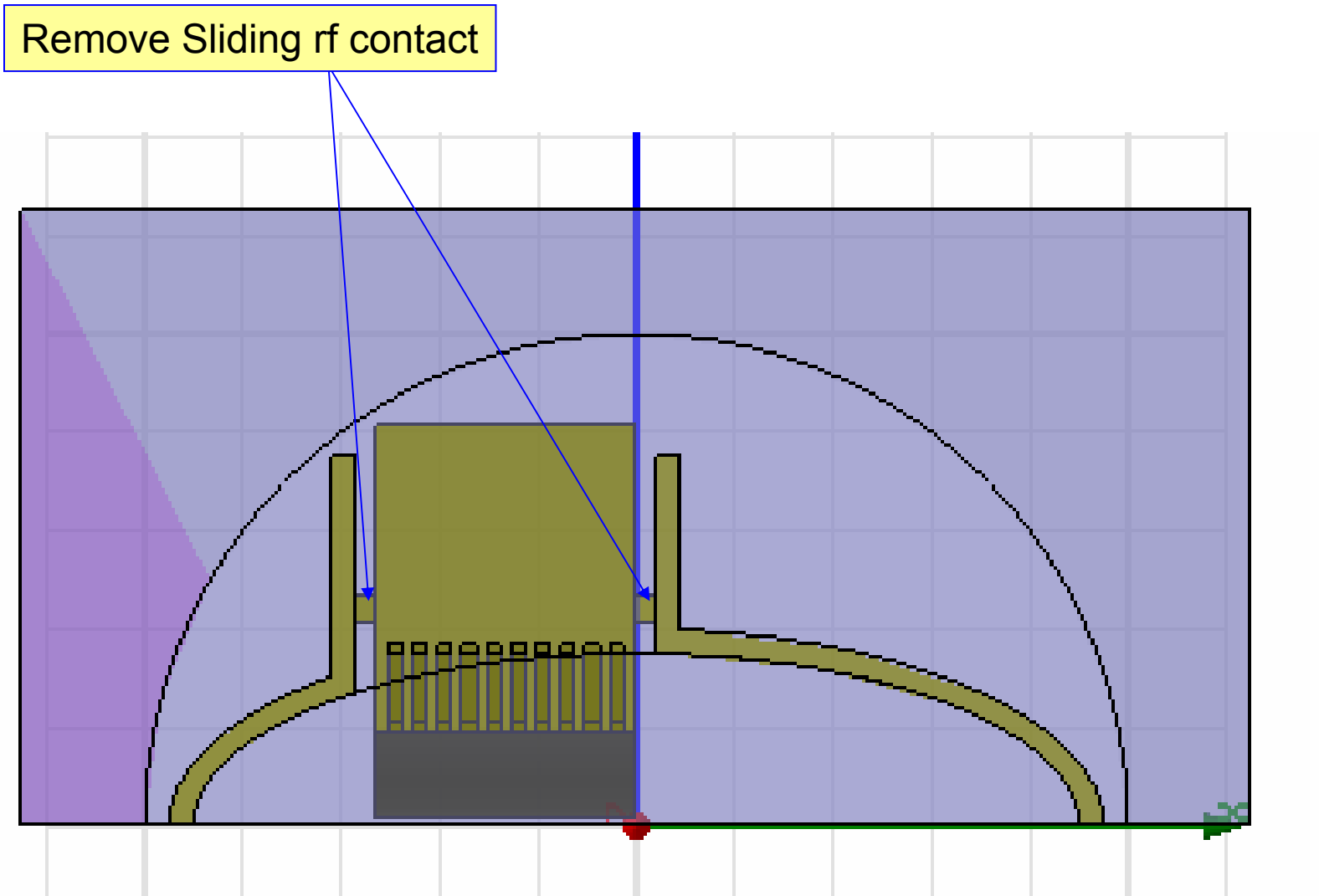


Analytical Estimate

Yokoya (1990): BB impedance for circular geometry: ~20 kΩ/m
=> for parallel plate: ~ 35 kΩ/m

Strong indication that there is a bug in GdfidL simulation for BB transvese impedance

Dipole trapped mode damping with 4S60 ferrite



Conclusions and recomentadions

- Transverse impedance of the present design (both Broad Band and trapped modes) is too high if we trust GdfidL full geometry simulation but acceptable if we trust analytical estimate and parallel plate simulation with GdfidL
- Reduction of jaw taper angle from 15 to 10(7) degree and/or making non-linear taper is not a solution for the trapped modes and the BB impedance
- A possible solution for reduction of impedance of the dipole trapped modes by means of damping could be opening the longitudinal slots.
- The drawback will be excitation of low frequency trapped modes both monopole and dipole which on the other hand can be damped efficiently. (to be demonstrated)