wake / impedance calculation

the usual approximations

- v = c
- linear motion
- rigid beam
- integrated kick
- no space charge
- thin beam
- semi infinite beam pipes

the usual methods

- short range: window
- long range: full field calculation
  sometimes modal

the problems

- numerical dispersion
- field-particle interaction far after
  - structure: “indirect” wake integration
  - not always available
- FD methods: geometry approximation

improvements in the last years

- short range: rz: nearly all problems solved
  - 3d: dispersion, geo. approx. (echo3d)
  - no general solution for wake integration
- long range & full field: parallel computing
  - (not available for everybody)

not only beam dynamics

heating / losses

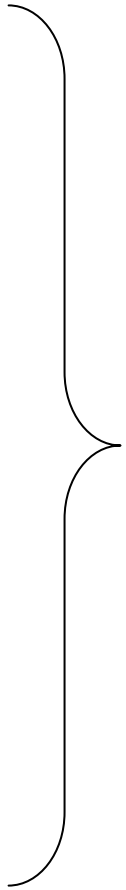
- online monitors:
  - peak fields
  - peak power
  - time integrals of losses, fluxes

diagnostics

- wakes interfere with diagnostics (e.g. BPMs)
- wakes are used for diagnostics (e.g.EOS)

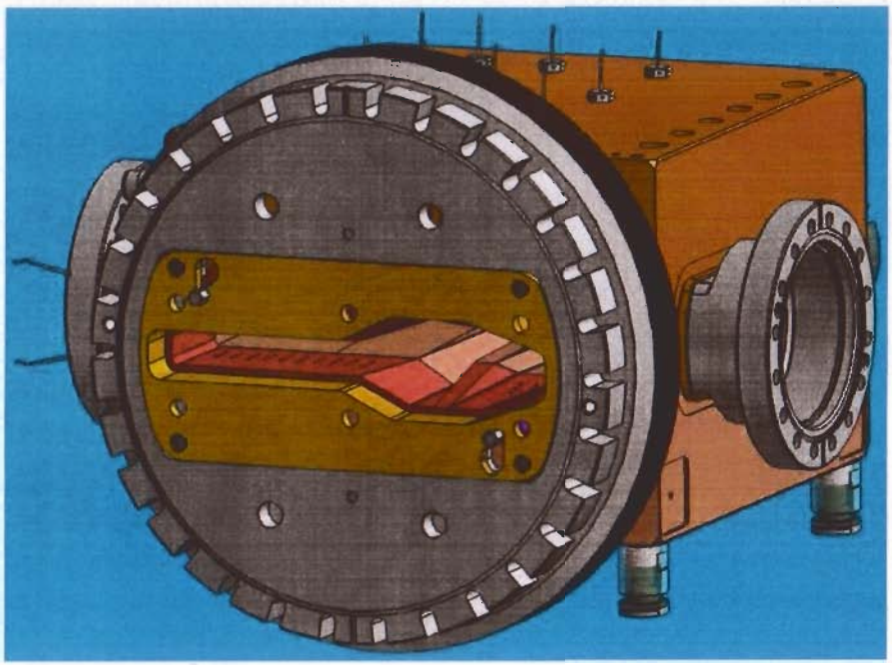
design of components

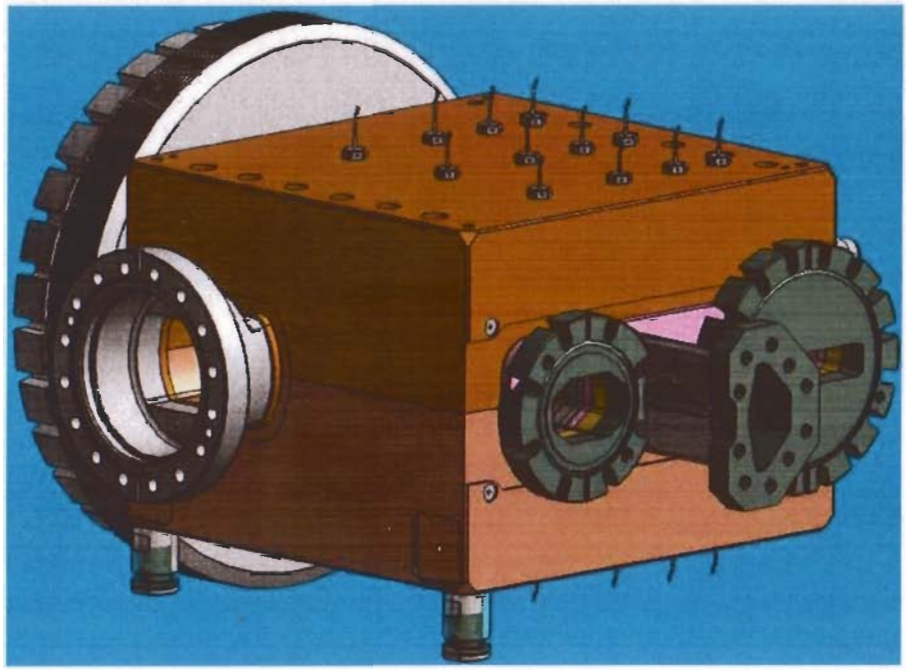
- coupler (f < fc)
- absorber (f < fc … f >> fc)



full field calculation required !!!

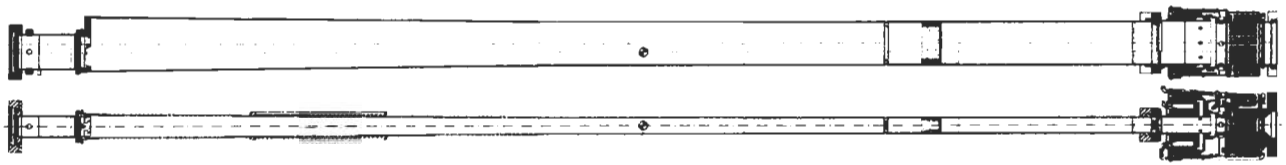
difficult





difficult

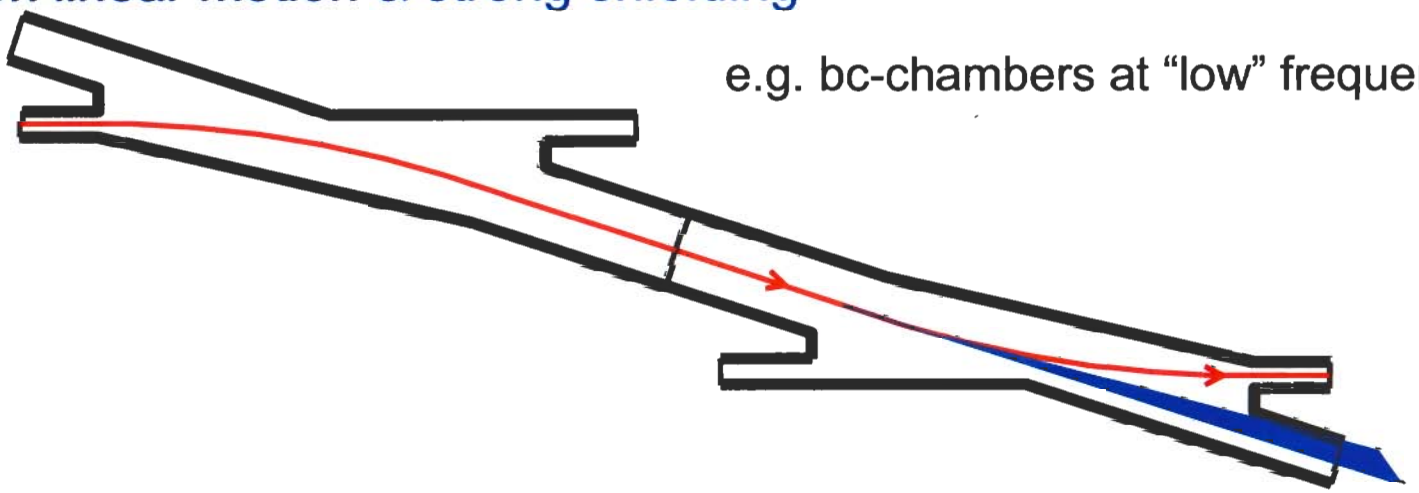
long structures … multiple structures coupled by long waveguides & long range wake & $\tau \propto T_b$



e.g. interaction regions

non linear motion ---> CSR codes

non linear motion & strong shielding



e.g. bc-chambers at “low” frequencies