Long Range Wakefield Calculation

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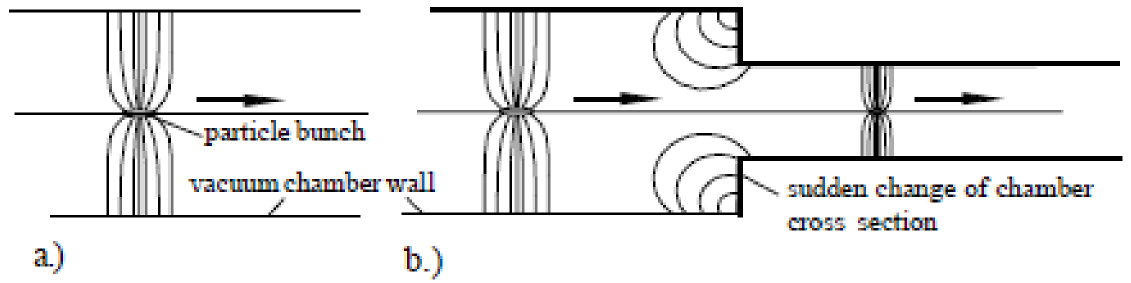
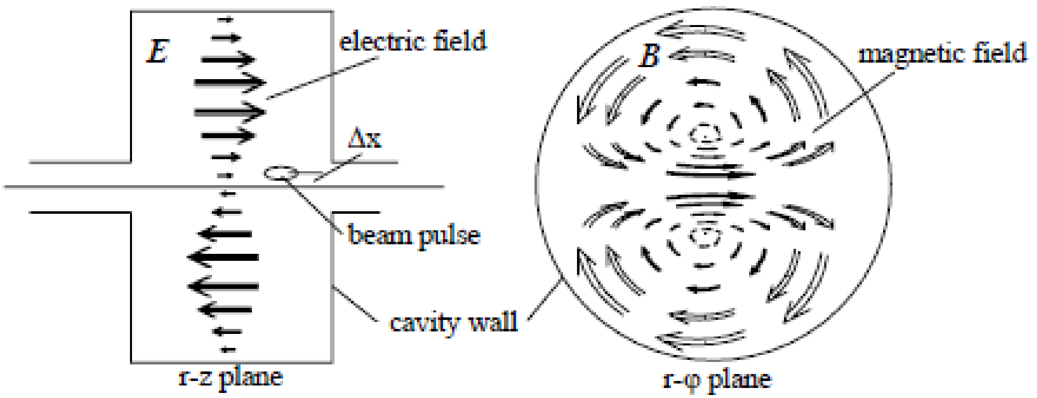


Coupling of a charged particle beam to the environment; uniform chamber cross section (a) and obstacle on vacuum chamber surface (b)



Transverse parasitic mode in a pill box cavity

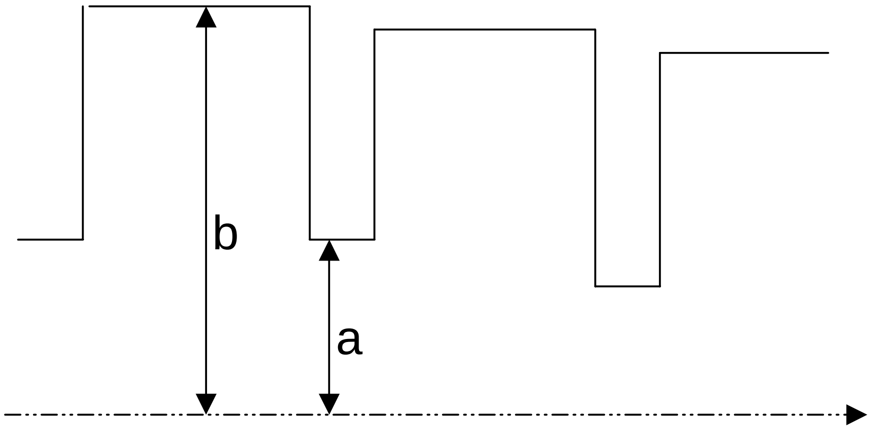


Fig. 1. The cell geometry

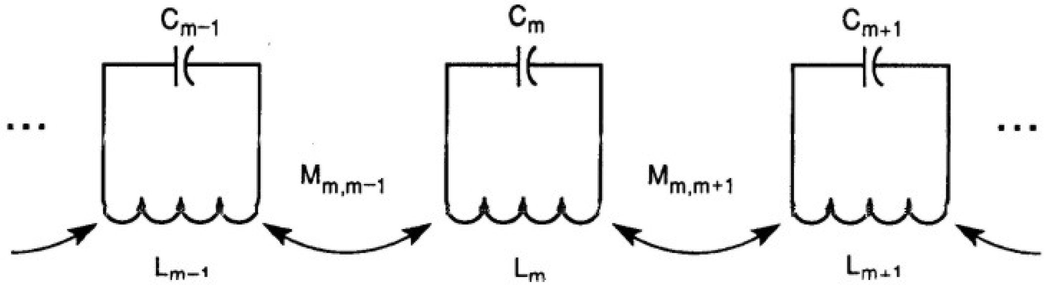


Fig. 2. A single chain circuit model of the accelerator structure.

$$\left(1-\frac{{\nu_n}^2}{\nu^2}\right)i_m+\frac{M_{m,m+1}}{2L_m}i_{m+1}+\frac{M_{m,m-1}}{2L_m}i_{m-1}=0 \qquad m=1,2,\ldots N$$

ν_n -resonant frequencies of the n-th circuit loop

ν -resonant frequencies of the chain

$M_{m,m+1}$ -coupling coefficient between subsequent loops

$$(2\pi\nu_m)^2=\frac{1}{L_mC_m}$$

Dipole wakefield of the structure is given by

$$W(s)=2\sum_{n=1}^{\infty}K_n\sin\frac{2\pi\nu_n s}{c}e^{-\pi\nu_n s/(cQ_n)} \qquad s>0$$

K_n -kick factor

ν_n -frequency of the n-th dipole mode of the structure

Q_n -quality factor of the n-th dipole mode of the structure

Future Steps

- Comparison of different numerical codes (Echo, CST ets)
- Comparison of analytical results and numerical calculations
- Performing numerical calculations for various structures