

# Preliminary Main Linac Simulation Including Coupler RF Kick

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# Coupler RF Kick

Asymmetries of couplers (input coupler and HOM couplers) make transverse RF field in accelerating cavity.

From presentation of V. Yakovlev in Wakefield Workshop, Dec. 2007, at SLAC,

- Phase: -0.989 rad from peak of accelerating field
- Amplitude: 13E-6 times accelerating field

$$V_y = ae^{i\theta}V_z \quad (a = 1.3 \times 10^{-5}, \quad \theta = -0.989)$$

(This is not explicitly shown in Yakivlev's presentation. They were calculated by K.K. from his slides and may not be accurate.)

# Effects of Coupler RF Kick

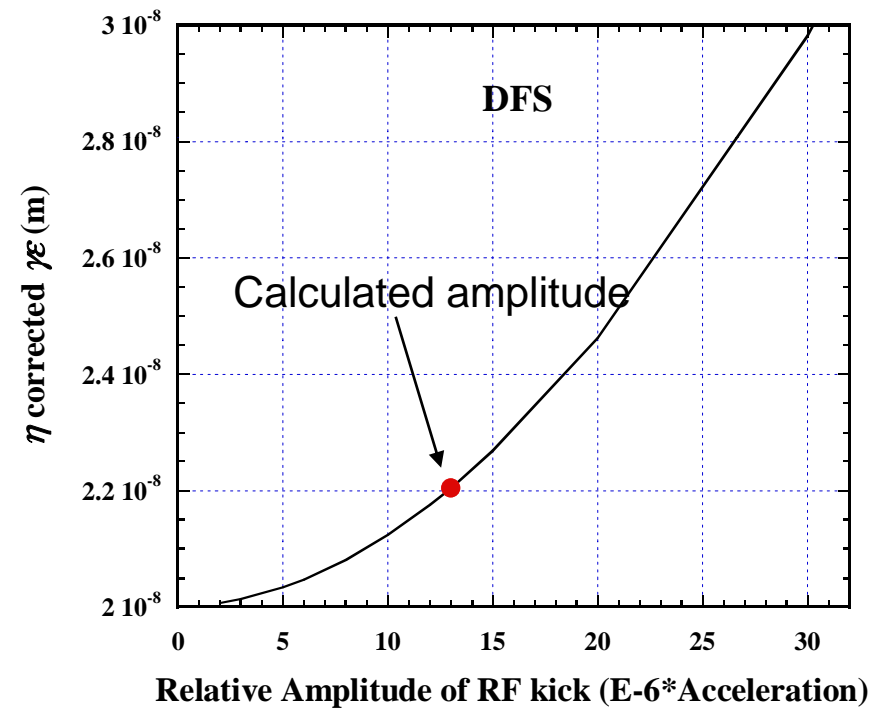
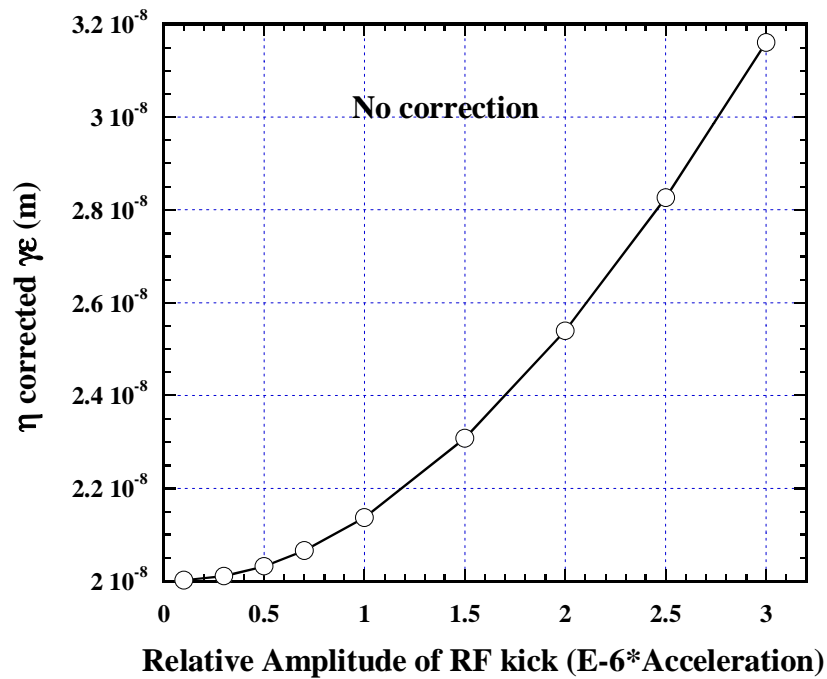
- Transverse orbit change (kick of bunch center) → mostly cured by orbit correction.
- Head-tail difference of kick → Causes emittance growth.

→ Simulation changing amplitude and phase in Main Linac.

# Dependence on Amplitude

In perfect Main Linac

Phase=-0.989 rad.

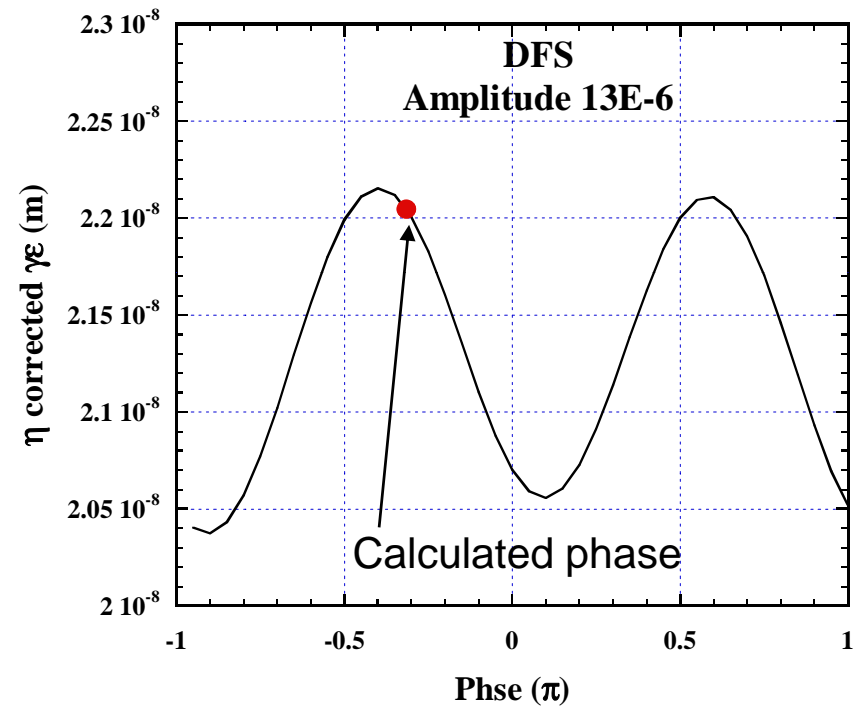
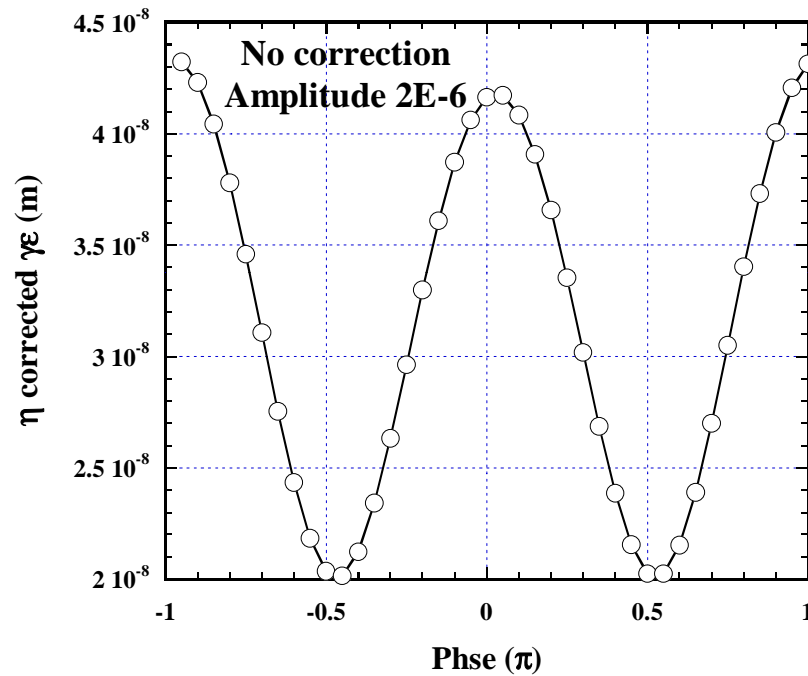


# Dependence on phase

No Orbit Correction

In perfect Main Linac

DFS



Head-tail kick difference is important after DFS.  
The calculated phase is close to the worst.

# Summary

Main Linac simulation was performed including Coupler RF kick

- Results are preliminary. Parameters should be checked
- Head-tail kick difference is important after orbit correction.
- Emittance growth is about 2 nm (10% of nominal) after DRS with the calculated parameters.
- The calculated phase is close to the worst.

Effects in Bunch Compressors may be larger. Should be studied.

More accurate RF field calculations seems to be coming soon. (?)

Transverse kick by coupler wakefield is another issue.