Beta function and trim quads

June 3, 2003

Purpose: To see how large trim quads can change the beta functions and show possibilities to optimize beta functions with trim quads.

$$\frac{\Delta\beta(s)}{\beta(s)} = -\frac{1}{2\sin(2\pi\nu_0)}\sum_{i=1}^{48} k1(i)\beta(i)\cos[2\pi\nu_0 + 2|\psi(s) - \psi(i)|]l(i)$$

(S.Y. Lee, 2.192)

optimize by minimizing max(β_x)+max(β_y)

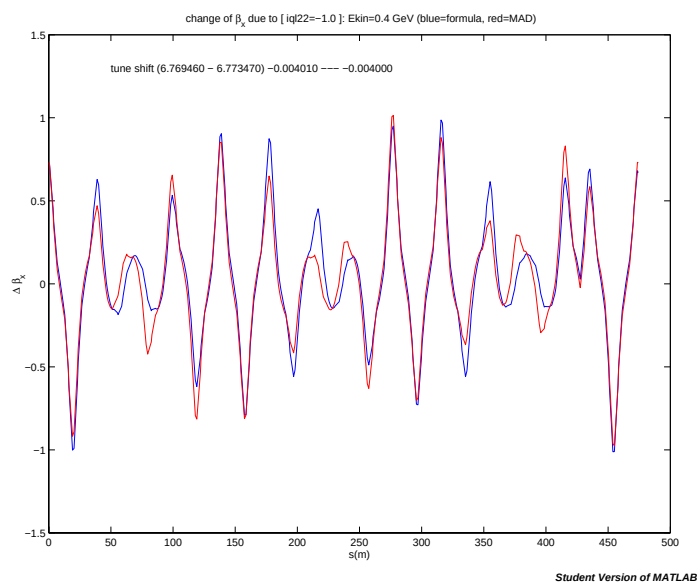

Figure 1: $\Delta\beta_x$ when only iql22 = -1.0, obtained using MAD (red) and Formula (blue). Tune shift = 6.76946 - 6.77347 = -0.00401

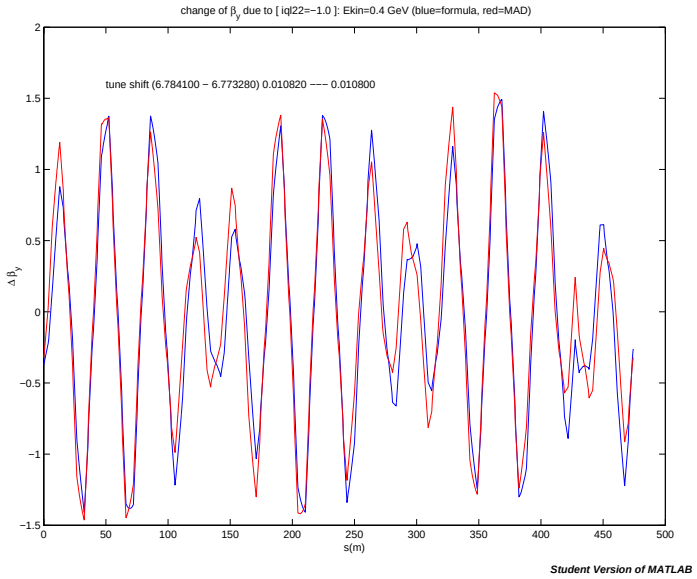

Figure 2: $\Delta\beta_y$ when only iql22 = -1.0, obtained using MAD (red) and Formula (blue). Tune shift = 6.78410 - 6.77328 = 0.01082

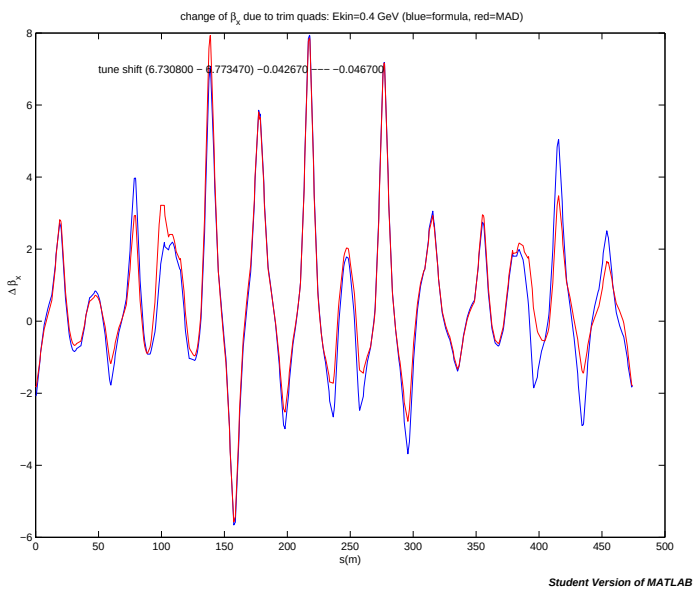

Figure 3: $\Delta\beta_x$ when quads are set to values as in operation, obtained using MAD (red) and Formula (blue). Tune shift = 6.73080 - 6.77347 = -0.04267

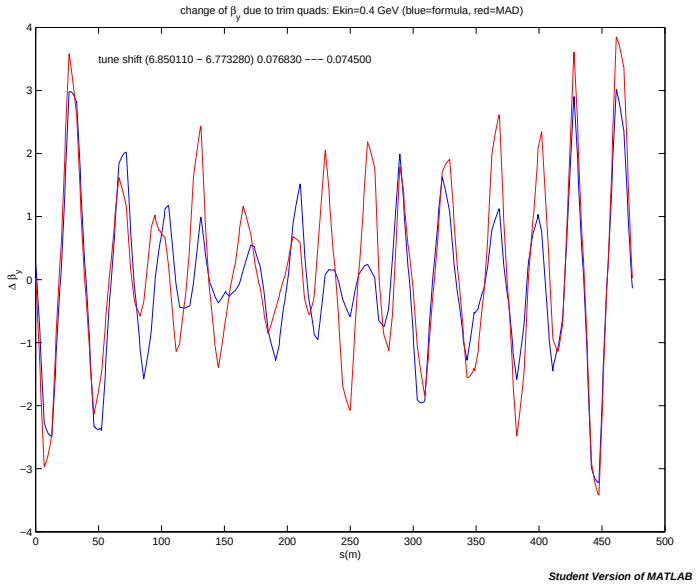

Figure 4: $\Delta\beta_y$ when quads are set to values as in operation, obtained using MAD (red) and Formula (blue). Tune shift = 6.85011 - 6.77328 = 0.07683

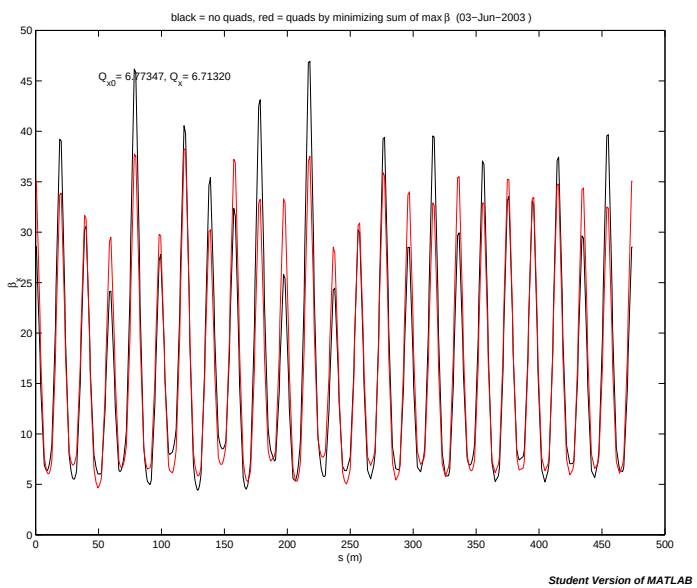

Figure 5: β_x with optimized trim quads. Black = no quads, Red = with optimized quads. Tune shift = 6.71320 - 6.77347 = -0.0603

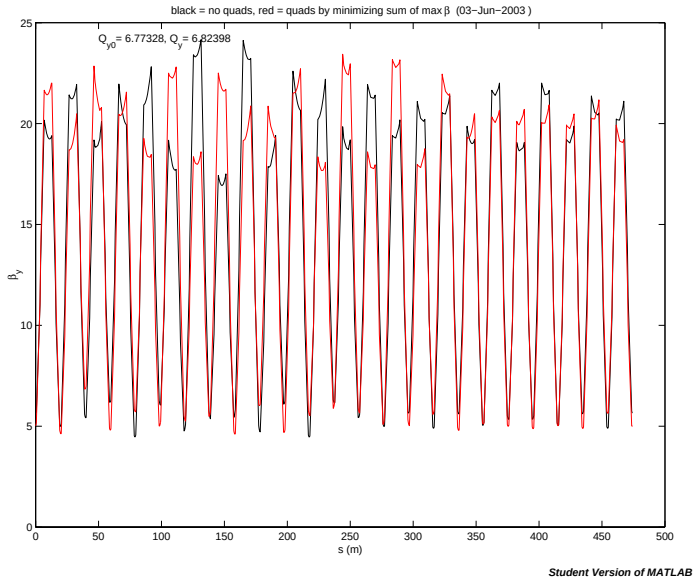

Figure 6: β_y with optimized trim quads. Black = no quads, Red = with optimized quads. Tune shift = 6.82398 - 6.77328 = 0.0507

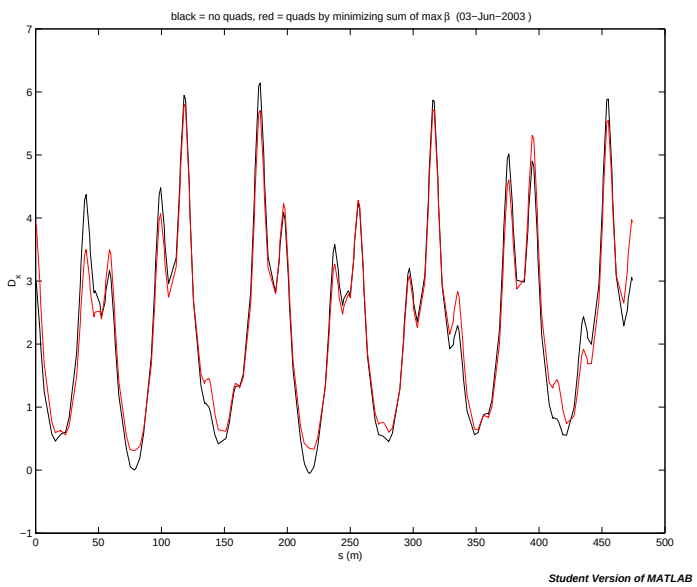

Figure 7: D_x with optimized trim quads. Black = no quads, Red = with optimized quads