Summary and Questions of multi-knobs
Compare reports of Okugi and Glen in July

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Okugi's report (Jul.13)

Linear knobs

- ΔX for FFsext -> change alphaX, alphaY, etaX, etaX'
  - ΔX of SF6FF, SF5FF, SD4FF, SF1FF, SD0FF
  - make AX, AY, EX, EPX knobs orthogonal
  - One free parameter is used to make range of knobs large.
- ΔY for FFsext -> change etaY, etaY', <x'y>
  - ΔY of SF6FF, SF5FF, SD4FF, SF1FF, SD0FF
  - make EY, EPY, Coup2 (<x'y>) knobs orthogonal
  - Two free parameters are used to make range of knobs large
- Exact constraint of "range of knobs" is not clear ?
- SVD or similar method is used?

Non-linear knobs

- ΔK2 of SF6FF, SF5FF, SD4FF, SF1FF, SD0FF
  - make X22, X26, X66, Y24, Y46 knobs orthogonal
    (Xmn~T2mn, Ymn~T3mn)

Glen's report (Jul.20)

Linear Knobs

- <x'y>, eta_y, alpha_y, T322, T326, apha_x, eta_x
- Ignore eta'
- Use x/y moves of FFS sextupoles
  - "Preferred solution is to exclusively use x/y moves of FFS sextupoles"
- Use Matlab "lscov" function to solve linear least-squares problem:
  - (A-M.K)'.diag(W).(A-M.K). Use weight vector *W* to control solution to give approximately orthonormal knobs.
- 10 free parameters (5 sextupoles, x and y) controlling 7 variables
  - Why only "approximately" orthogonal?
- Choice of Ws seems ambiguous? How to optimize?

Comparison

- Linear knobs
  - Both use moves of sextupoles for
    - alphaX, alphaY, etaX (x moves)
    - <x'y>, etaY (y moves)
  - etaX' and etaY': cared by Okugi but ignored by Glen (?)
  - Making orthogonal to T326 and T322 is tried (?) by Glen.
- Higher order knobs
  - Okugi uses strength change of sextupoles for X22, X26, X66, Y24, Y46 (T122, T126, T166, T324, T346) knobs
  - Glen use sextupole moves for T326, T322 knobs (made with linear knobs)