

Modelling of a Linearly Coupled Machine using the Coupled-Response Matrix, R. NAGAOKA,

ESRF - Recent studies show that the orbit response matrix can be utilised to perform an accurate calibration of the quadrupoles. An extension of this approach is attempted to analyse the linear coupling of a machine by making use of the off-diagonal part of the matrix, which refers to the orbit response due to displacement of the beam in the orthogonal plane. By introducing a sufficient number of skew components in the ring, their strengths are solved via matrix inversion to fit the measured coupled response. Simulations indicate that locally integrated strengths obtained are accurate enough to reproduce satisfactorily the coupling characteristics in all studied ESRF cases, although the resolution may not be as good to detect a rotation error of a single magnet. Application to the ESRF machine is made with and without the coupling correction, both yielding reasonable results. The latter, in particular, reveals several localised peaks in the skew distribution, using which, the machine with the uncorrected coupling can be successfully described, such as the vertical dispersion or the tune separation. Application of the developed scheme to perform the coupling correction is also discussed.