Decoupling of a Strongly Coupled Lattice with an Application to LHC, J.P. KOUTCHOUK, CERN - Micrometer displacements of the coil elements over the 15 m long LHC dipoles cause a significant parasitic skew quadrupole field a_2. Given the mass production of the dipoles with many other constraints, it would seem over-optimistic to assume that a_2 will be purely random. The present estimate of the bias, called systematic a_2, is $0.3 10^{-4}$ at 1 cm. Despite this small value, the width of the systematic linear coupling resonances is of the order of one tune unit, due to the unprecedented size of this superconducting machine. With an exact antisymmetry of the optics, LHC would have to be operated close to one or two systematic coupling resonance. This paper shows that even in this extreme situation, the theory of resonances holds. It explains the large focusing perturbations observed numerically and allows decoupling with only two families of skew quadrupoles. The robustness of LHC against coupling requires nevertheless relaxing the exact antisymmetry to allow matched tune splits of up to three units.