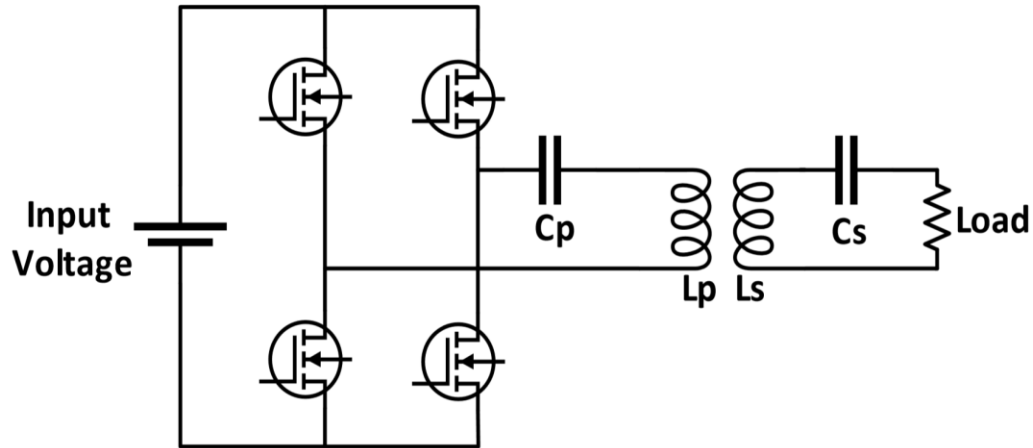


Series-Series Compensated Resonance Converter

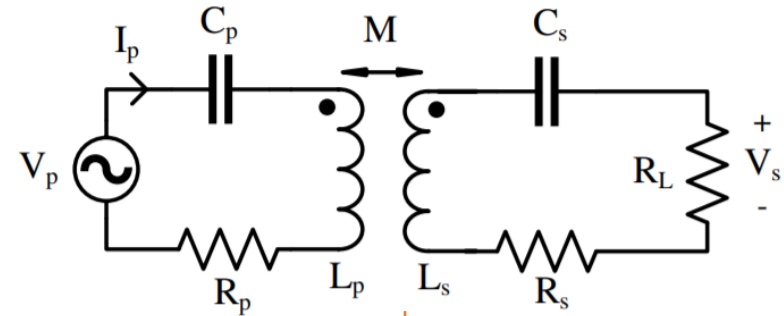


Series-Series Compensated System :

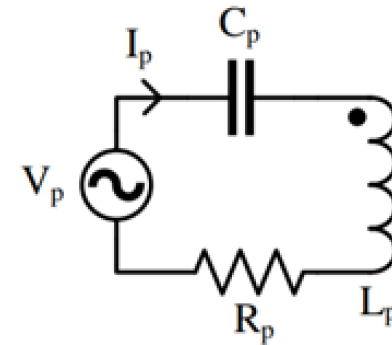
- Resonance Frequency is independent from load
- Resonance Frequency is independent of coupling coefficient
- However, no-load condition or very low mutual condition is a issue

No load Condition

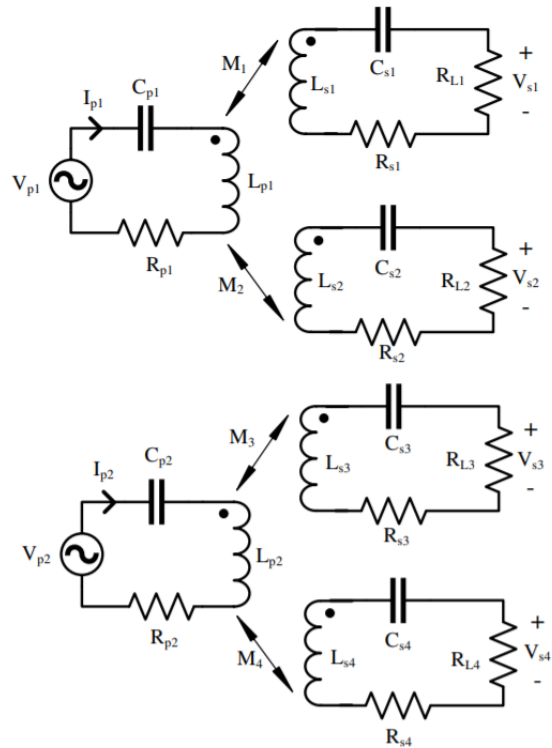
- Short-circuited primary.



Actually, primary is not coupled with any load. Thus, the primer current at resonance frequency is restricted with only parasitic resistance and inductor resistance.



Solution for no-load condition



Modular Design :

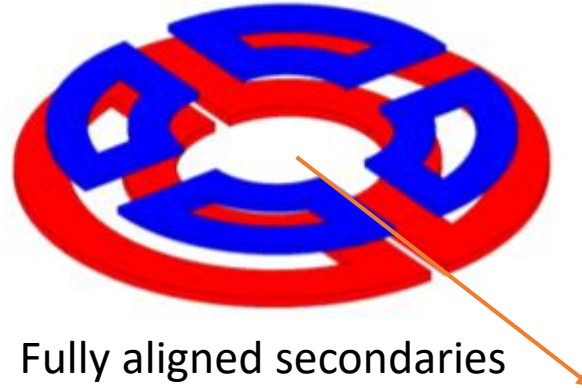
2 Primary and 4 Secondary

A primary is coupled with at least two secondary.

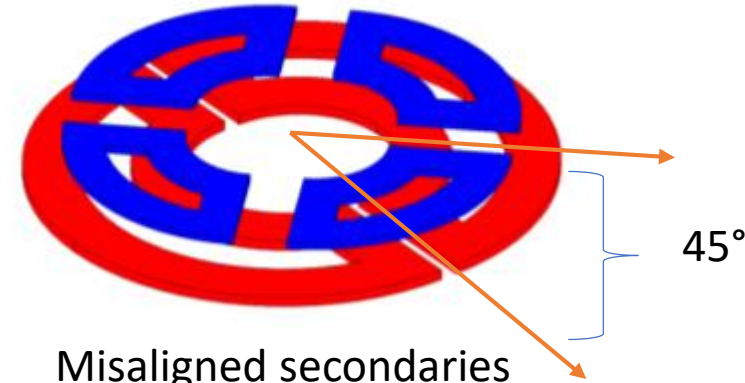


Rotational Misalignment

In our sytem, secondary side windings are rotated.



Fully aligned secondaries with primaries. (0°)



Misaligned secondaries with primaries. (45°)

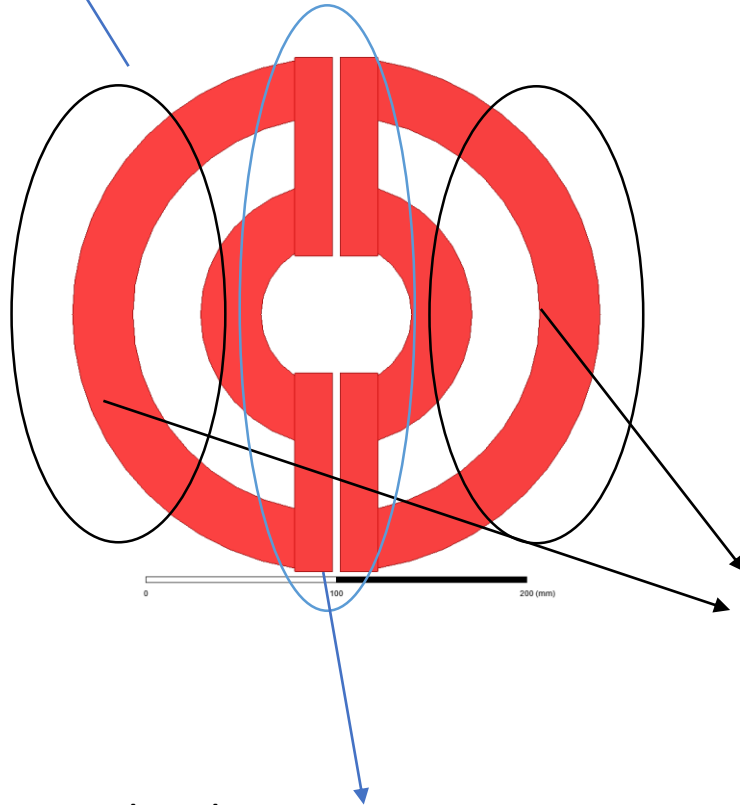
Thus, rotation does not cause a no-load condition for primary side.

Primary Winding

- 2 half circle with a hole for motor shaft
- Why does not it have a circular shape ? Beacuse is it required to mount motor without any mechanical decomposition

Formerly Proposed Design

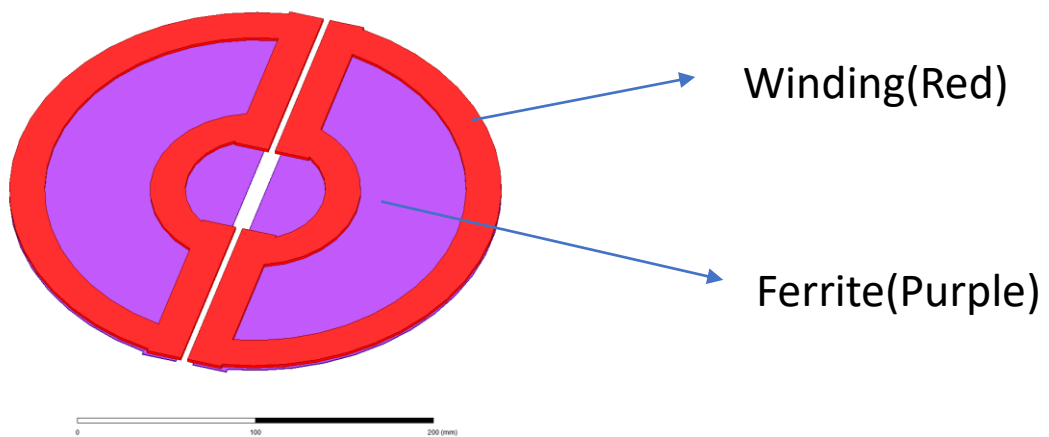
Top view
(only windings)



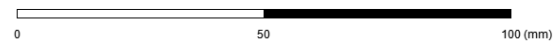
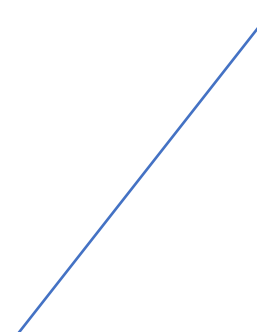
Constant flux
regions

Flux distortion region

- Modular design
- Primary windings can be thought as decoupled (0.05 coupling coefficient)
- Not giving a constant flux
- Flux is destroyed at transition between two primaries

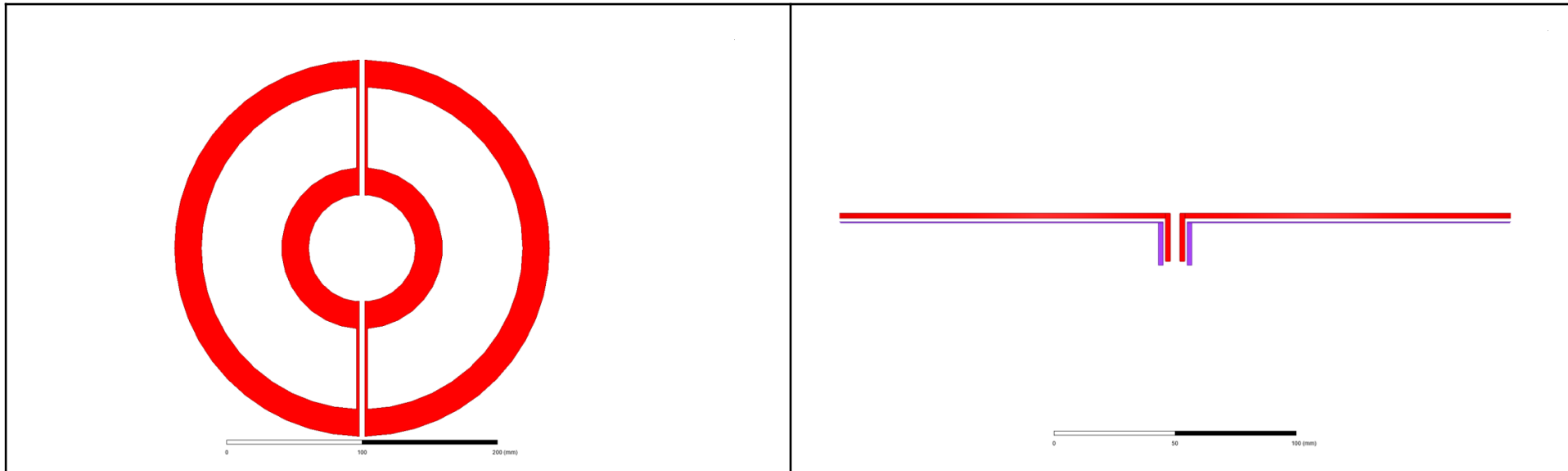


Sideview



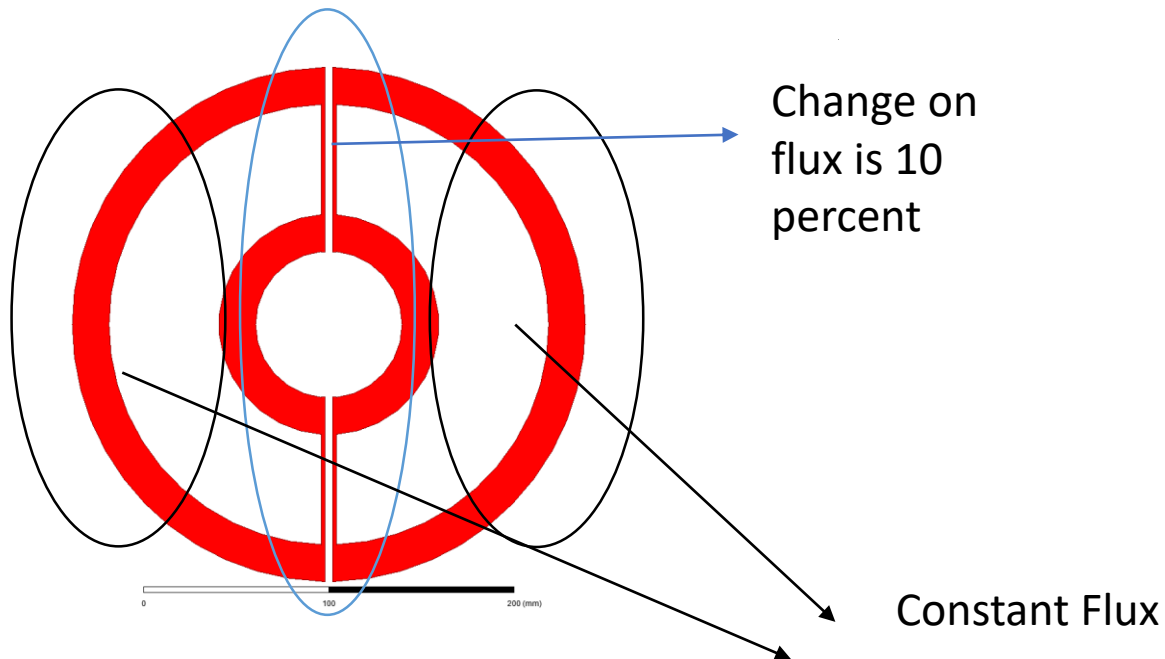
Proposed Design

- Problem: Flux distribution is not constant
- Solution : Bended endwindings of primary winding

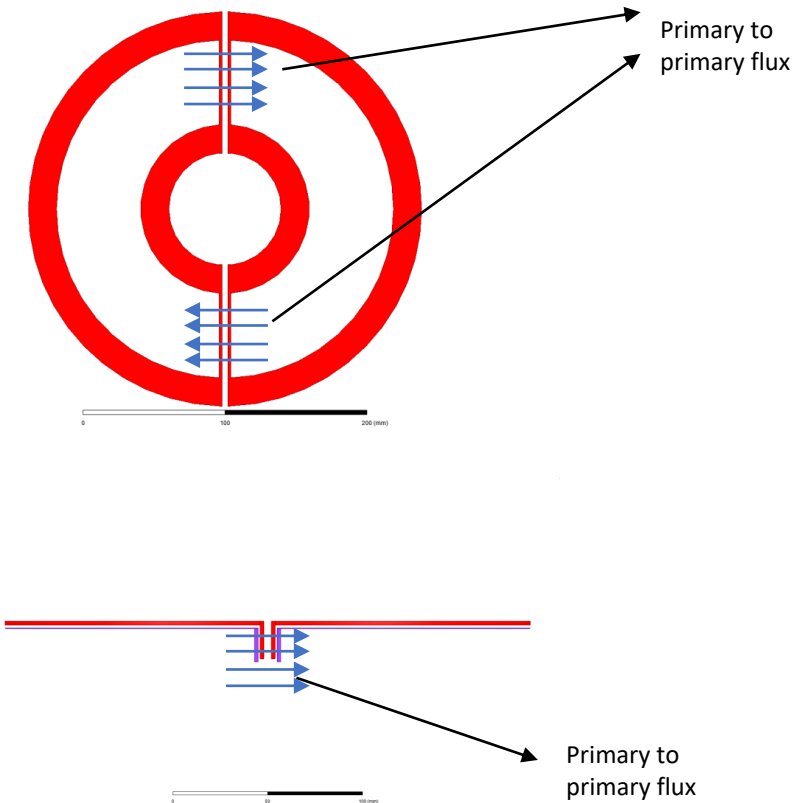


Pros and Cons

- Flux change is 10 percent between fully aligned and transition between two primaries.

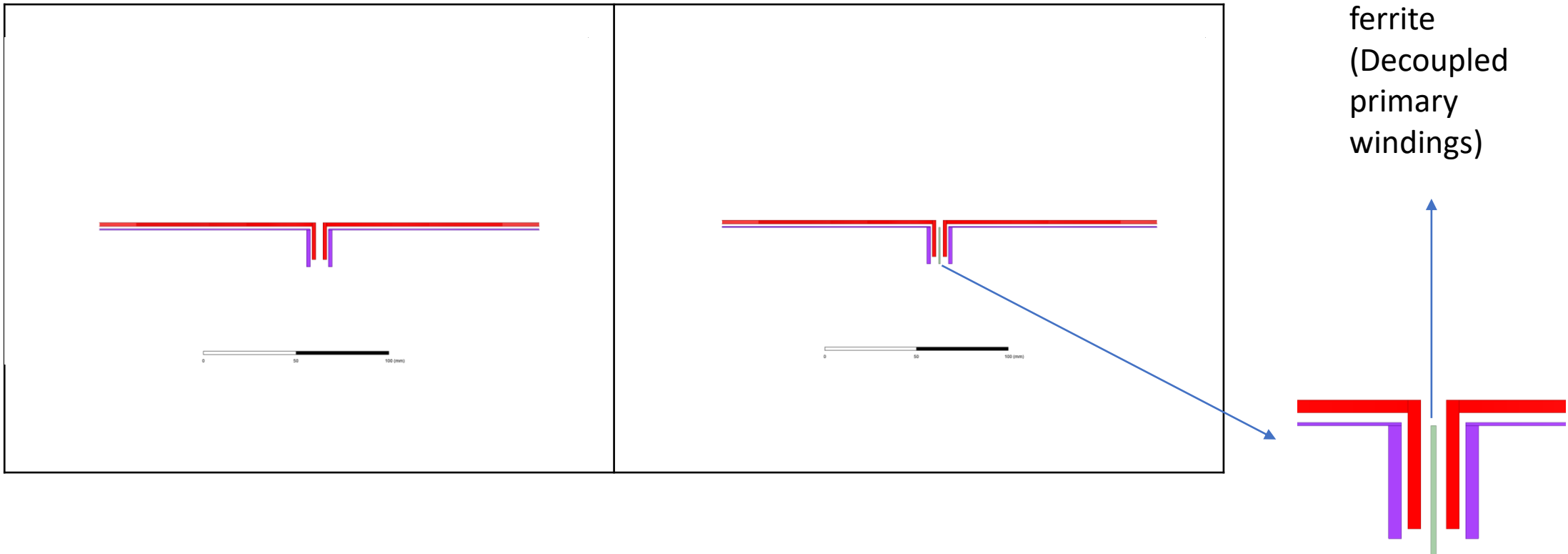


- Primary to primary flux is bigger than expectation .

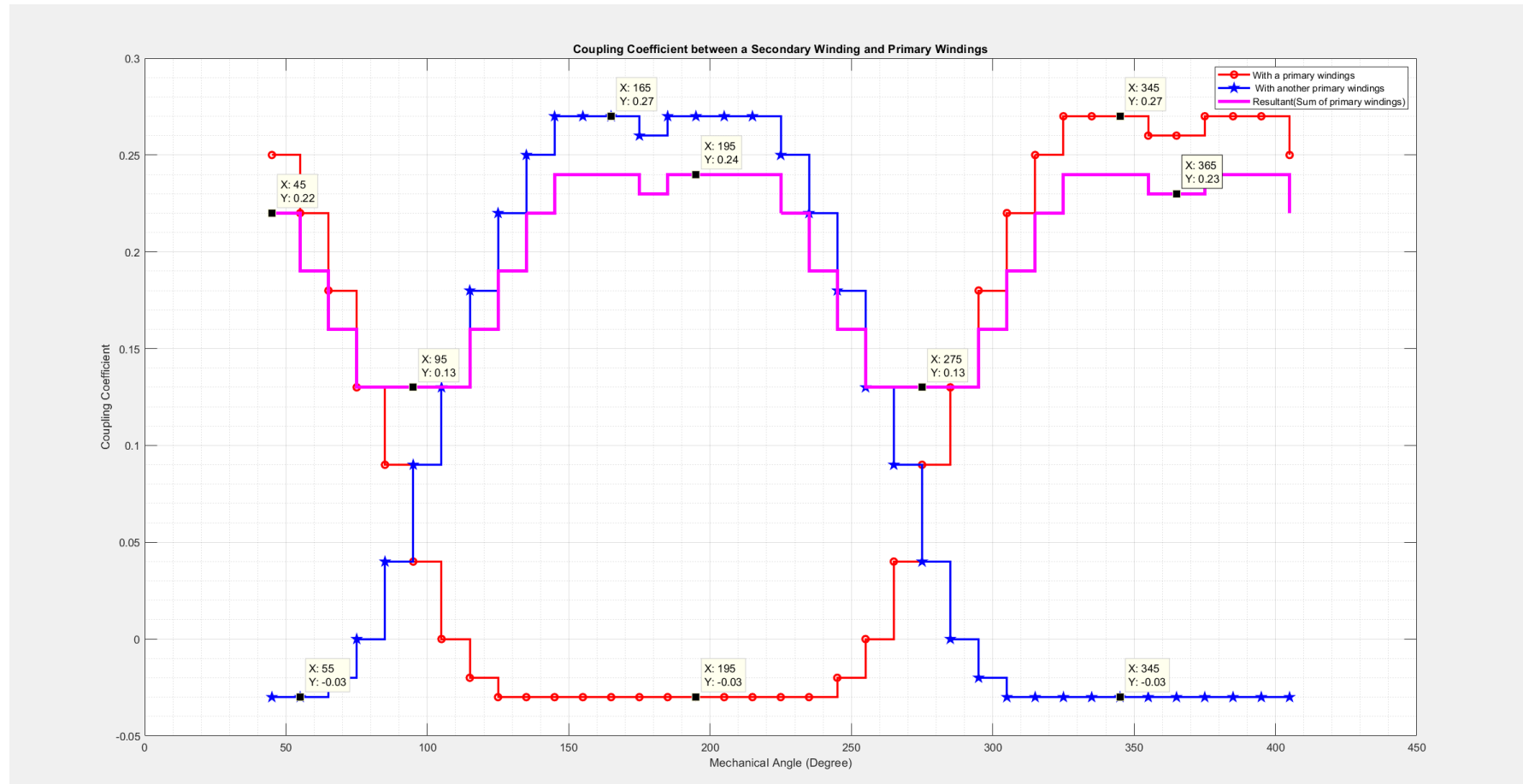


How can we decrease mutual inductance between two primary windings?

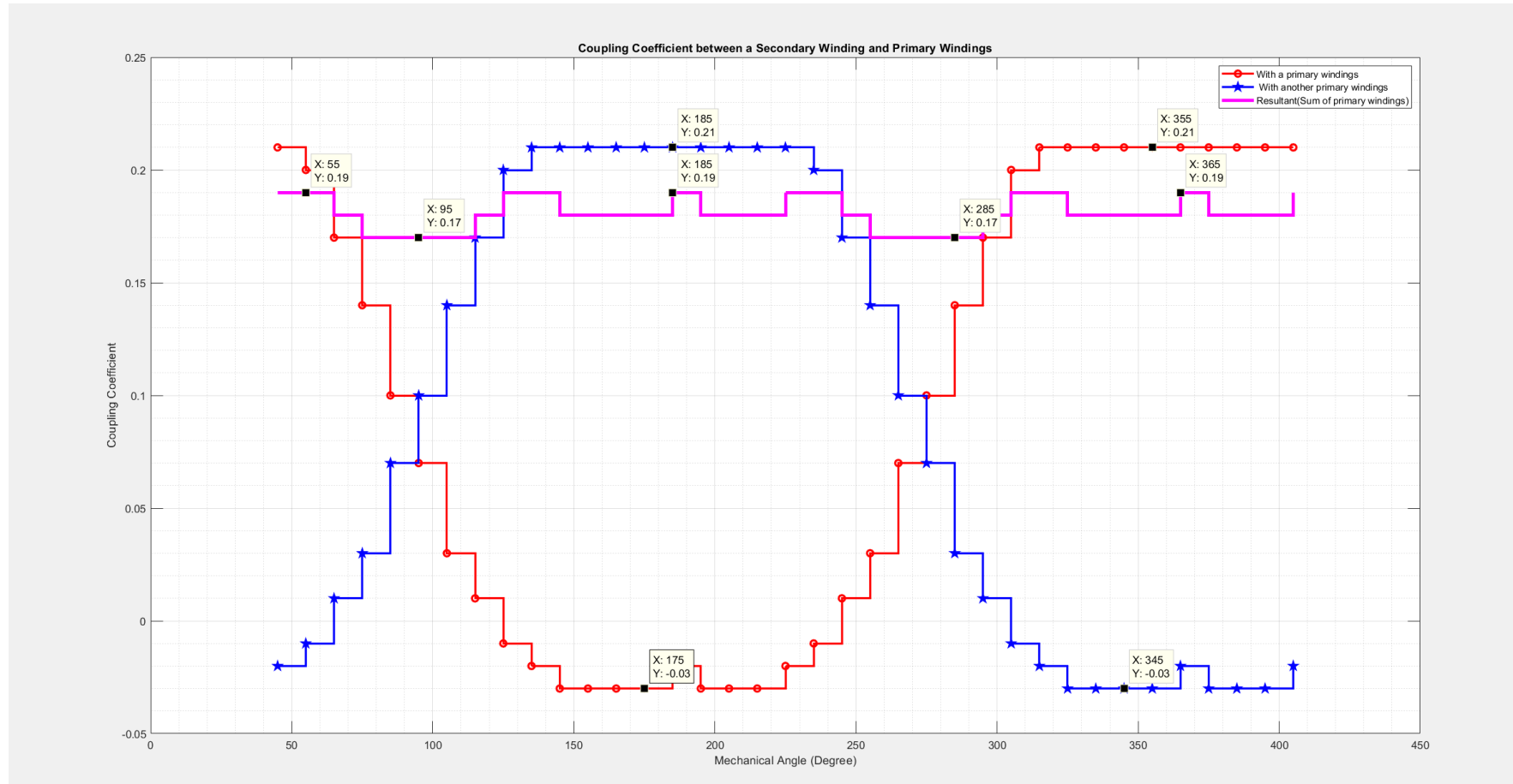
- Solution: Middle Ferrite core to decouple two primary windings



Results for Previous



Results for Proposed



Bonus Solution:

- Solution: Changing Air gap.
- Airgap is adjusted to make linked flux distribution constant. Thus, bended with a determined slope.

