1. Analytical Calculations

a)

Assuming sinusoidal inductance waveform, inductance formula

b)

c)

In order to model the whole system parameters with high accuracy finite element analysis programs can be used. These programs include the effects which are not being taken into the calculations such as fringing flux, non-homogenous flux distribution, saturation.

2)

a)

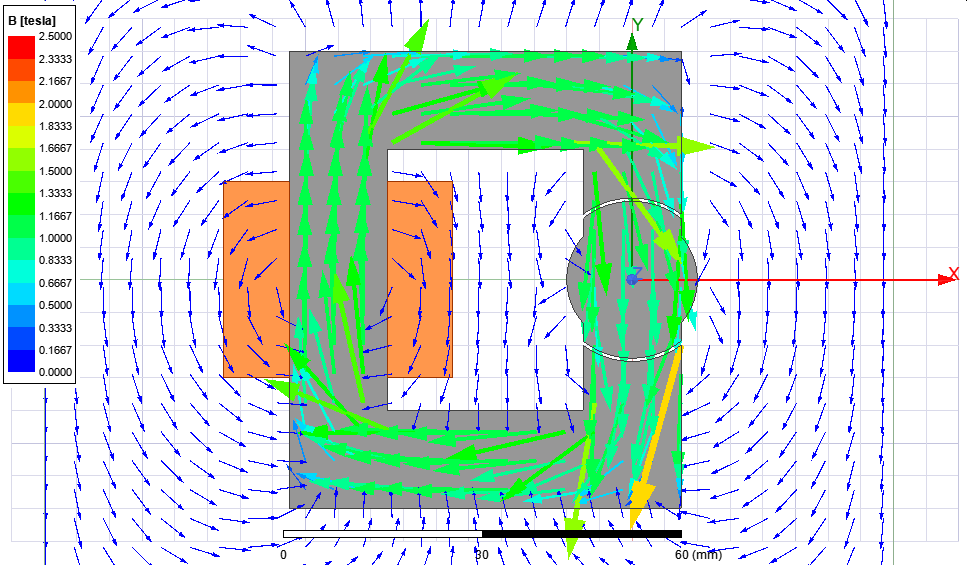


Figure . Flux density distribution at theta is equal to 0 degrees.

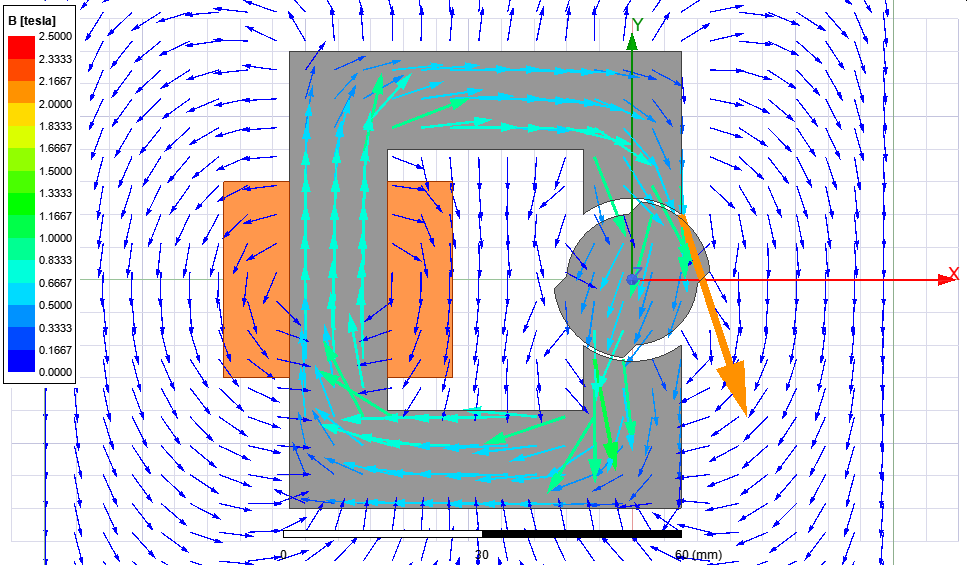


Figure . Flux density distribution at theta is equal to 45 degrees.

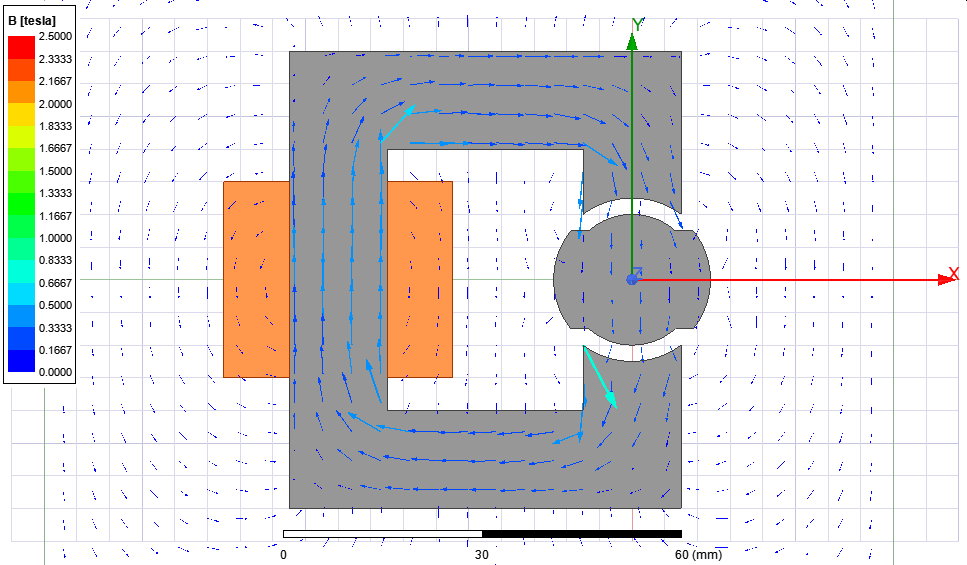


Figure . Flux density distribution at theta is equal to 90 degrees.

b)

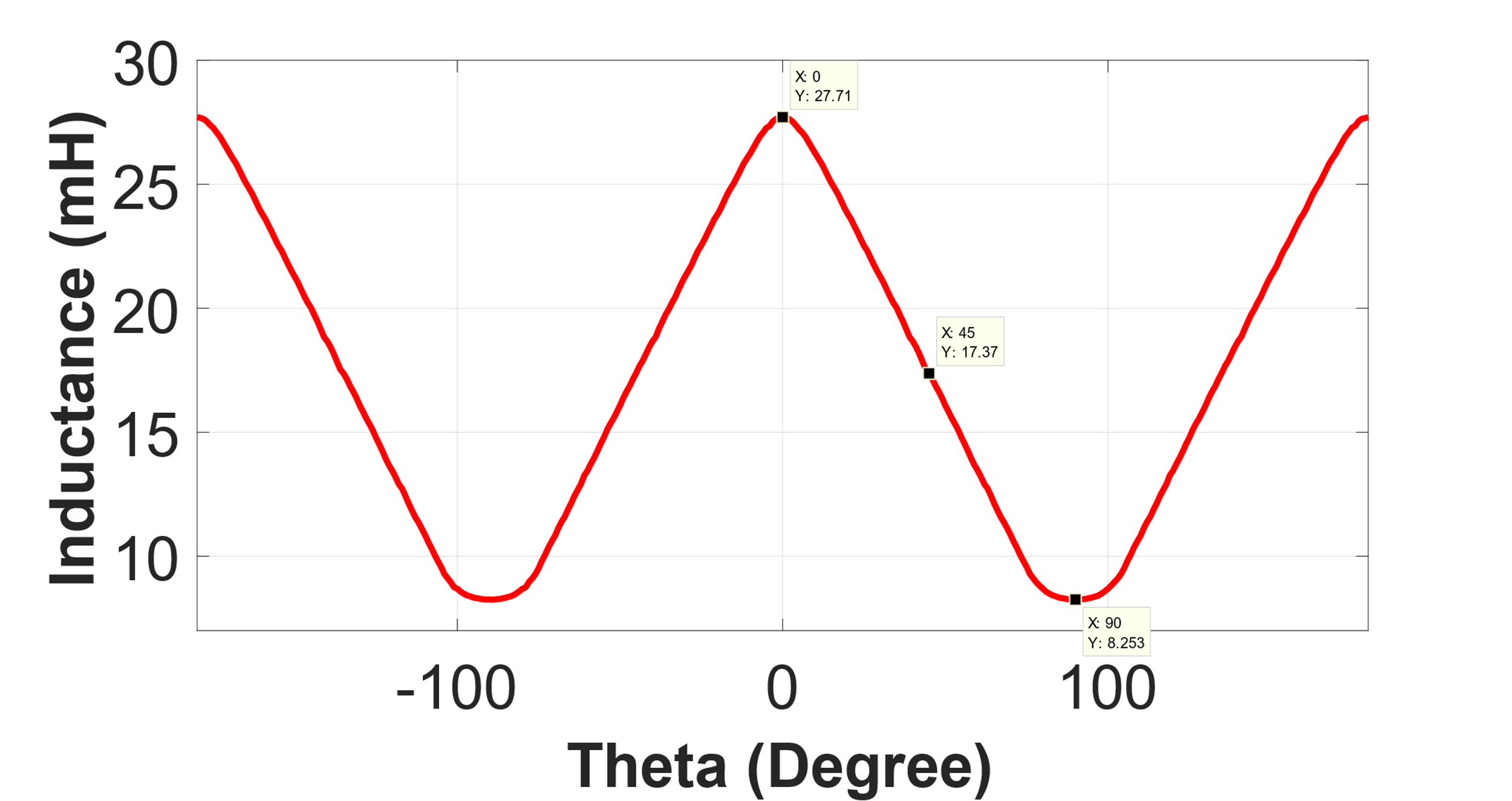


Figure . Inductance vs theta waveform of the model with linear material

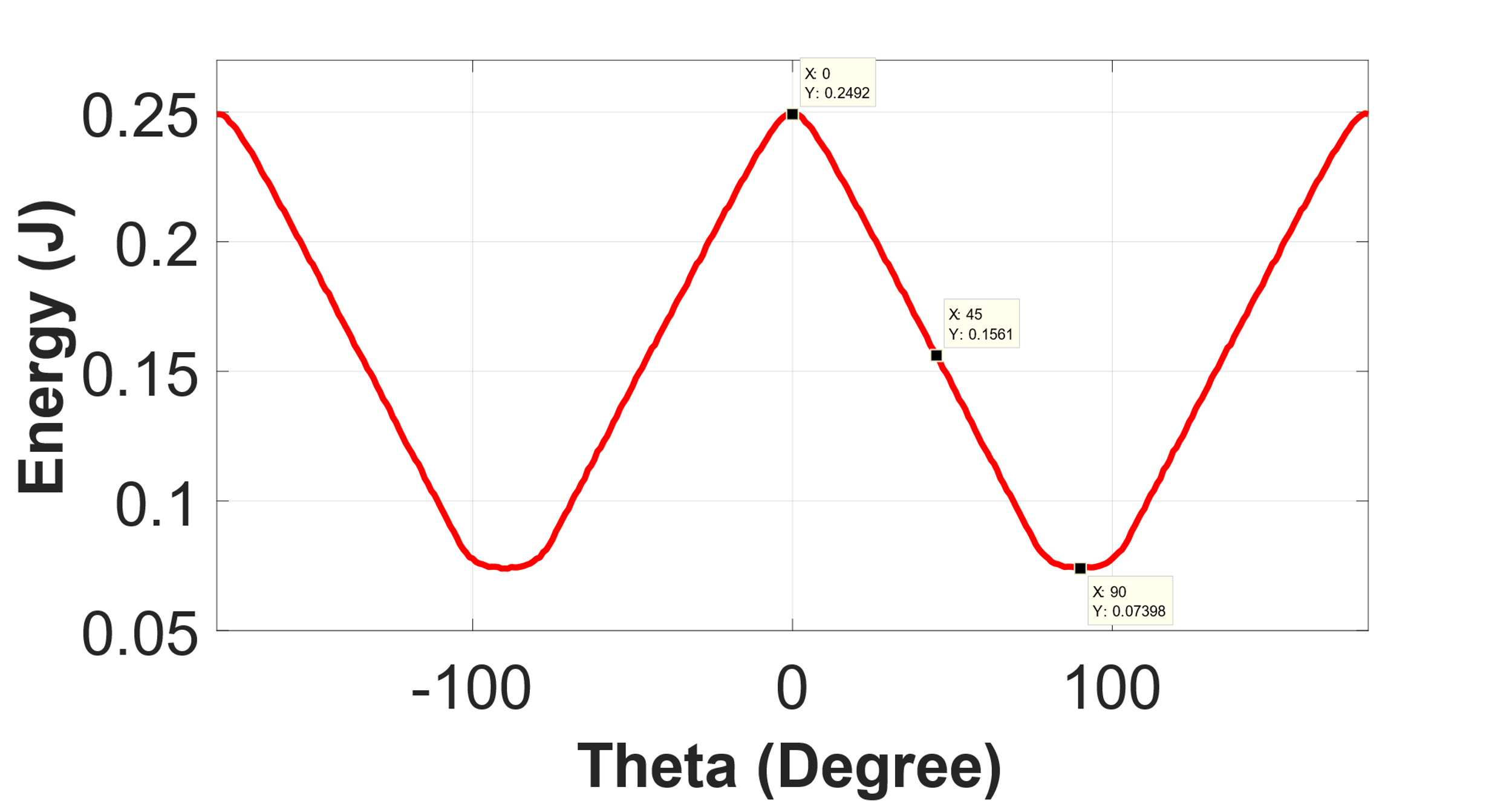


Figure . Energy vs theta waveform of the model with linear material

c)

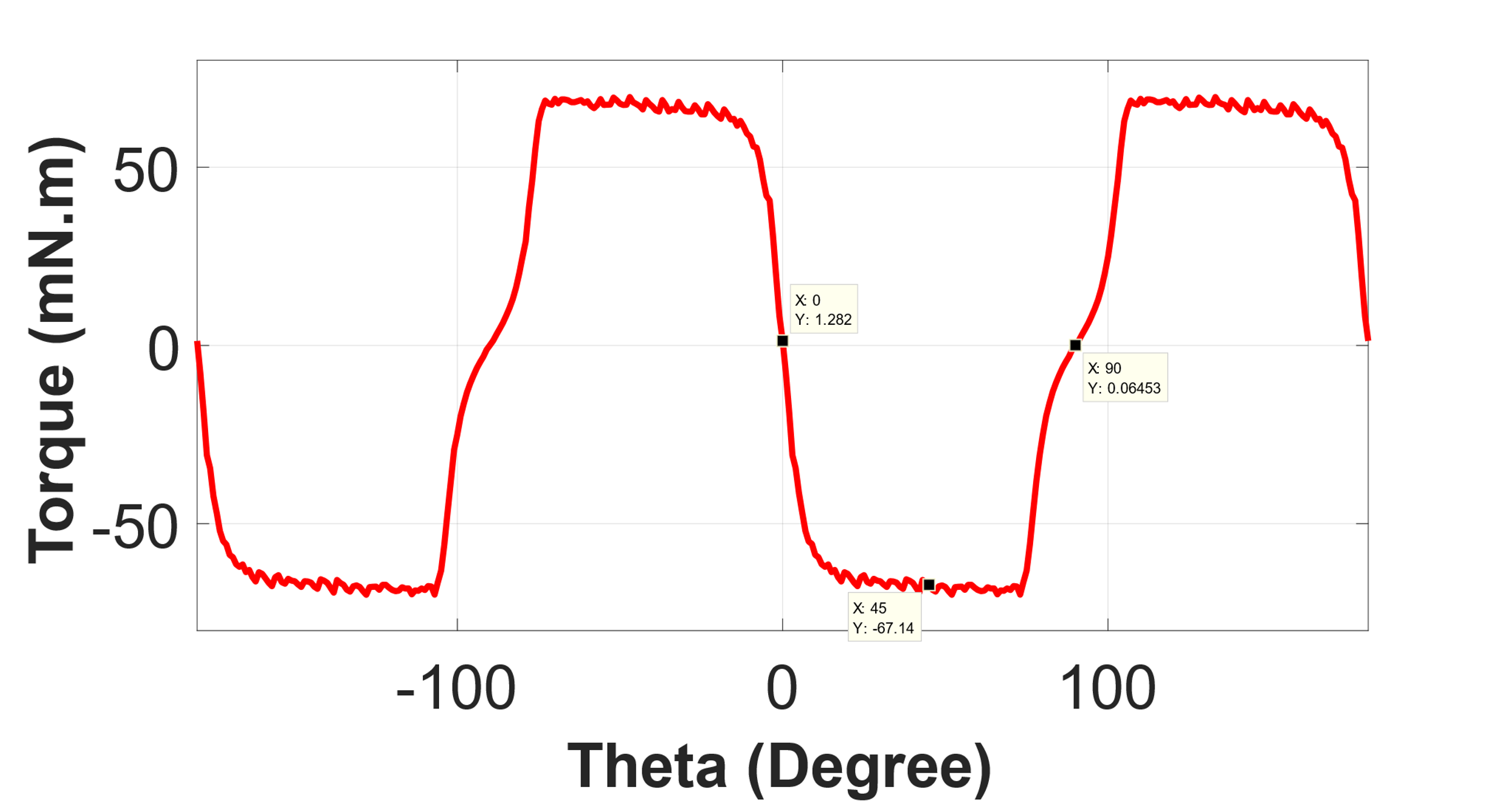


Figure . Torque vs theta waveform of the model with linear material

3)

a)

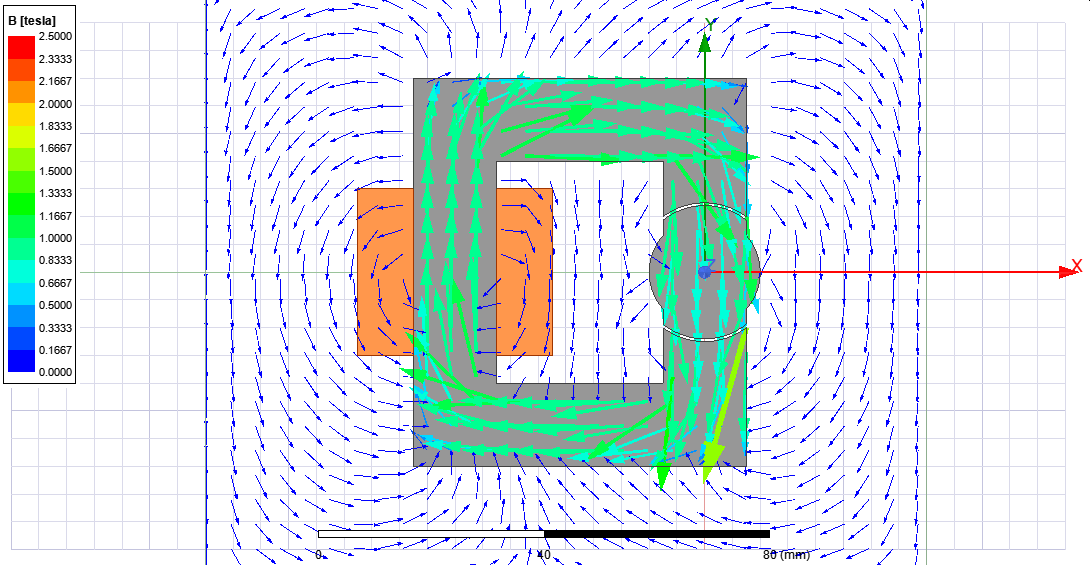


Figure .Flux density distribution with non-ideal core at theta is equal to 0 degrees.

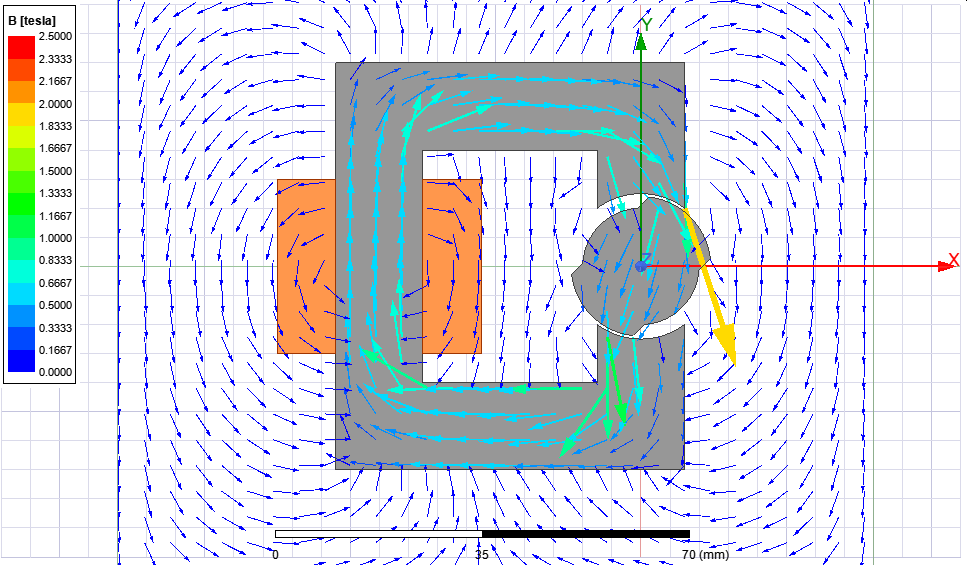


Figure .Flux density distribution with non-ideal core at theta is equal to 45 degrees.

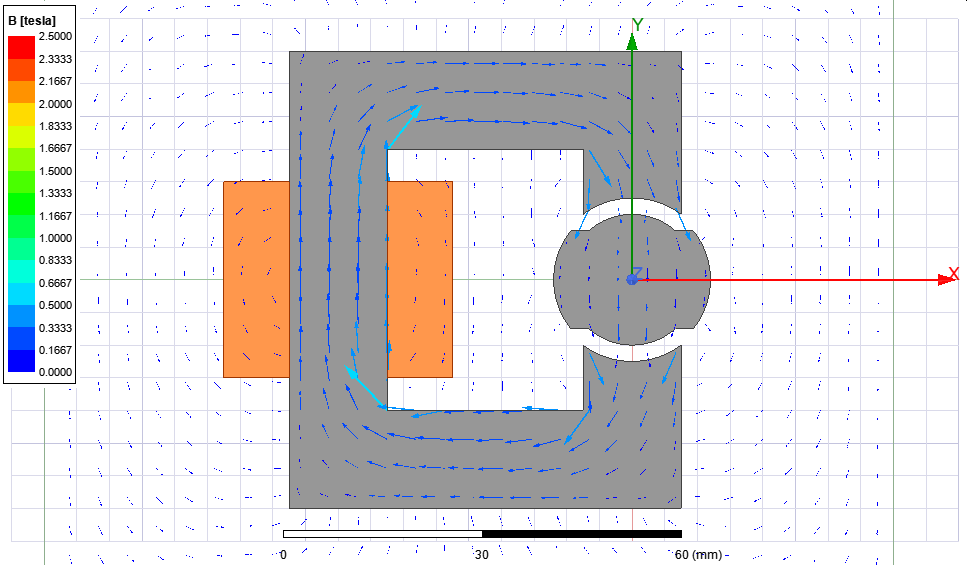


Figure .Flux density distribution with non-ideal core at theta is equal to 90 degrees.

b)

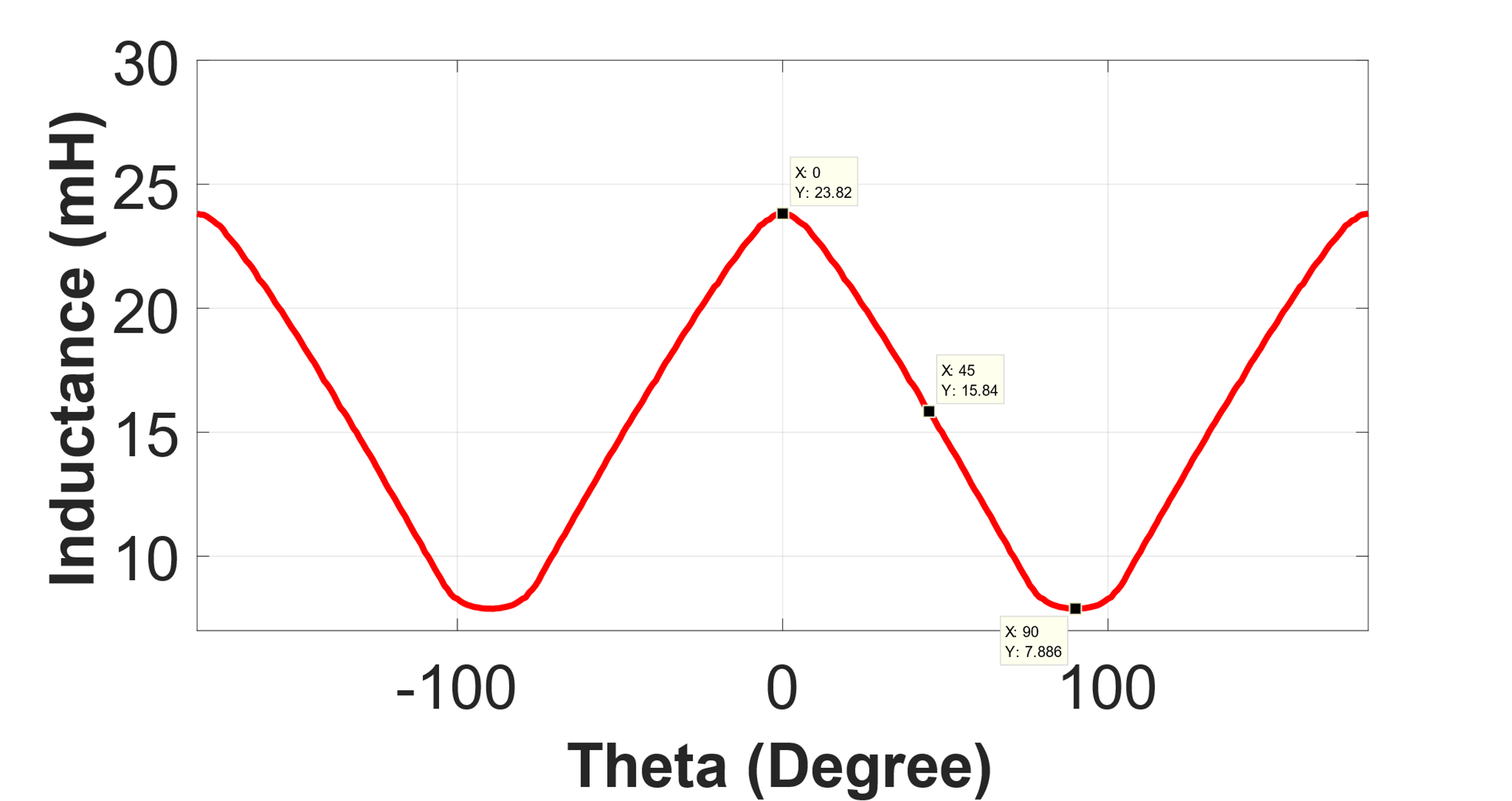


Figure . Inductance vs theta waveform of the model with non-linear material

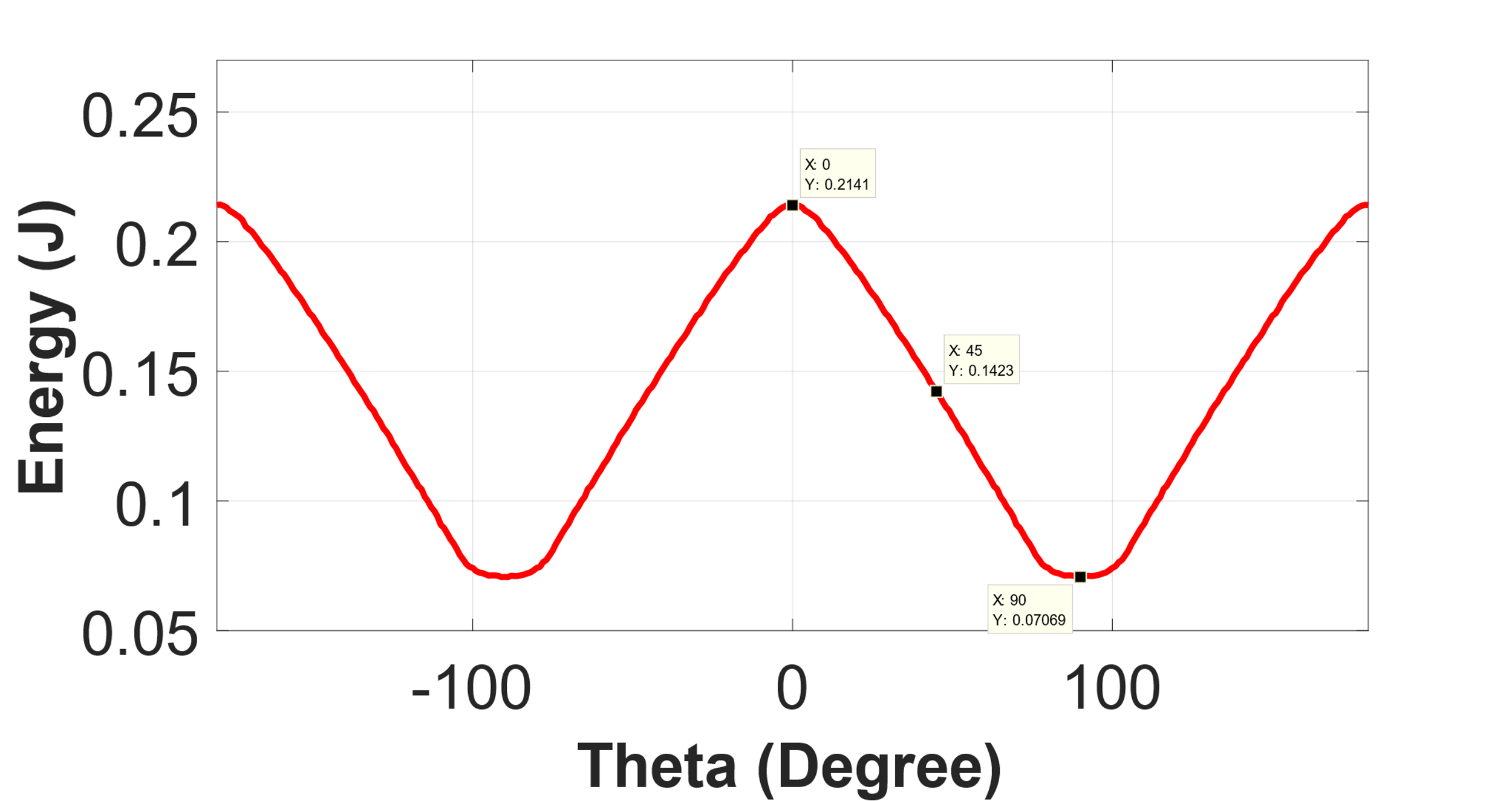


Figure . Energy vs theta waveform of the model with non-linear material

c)

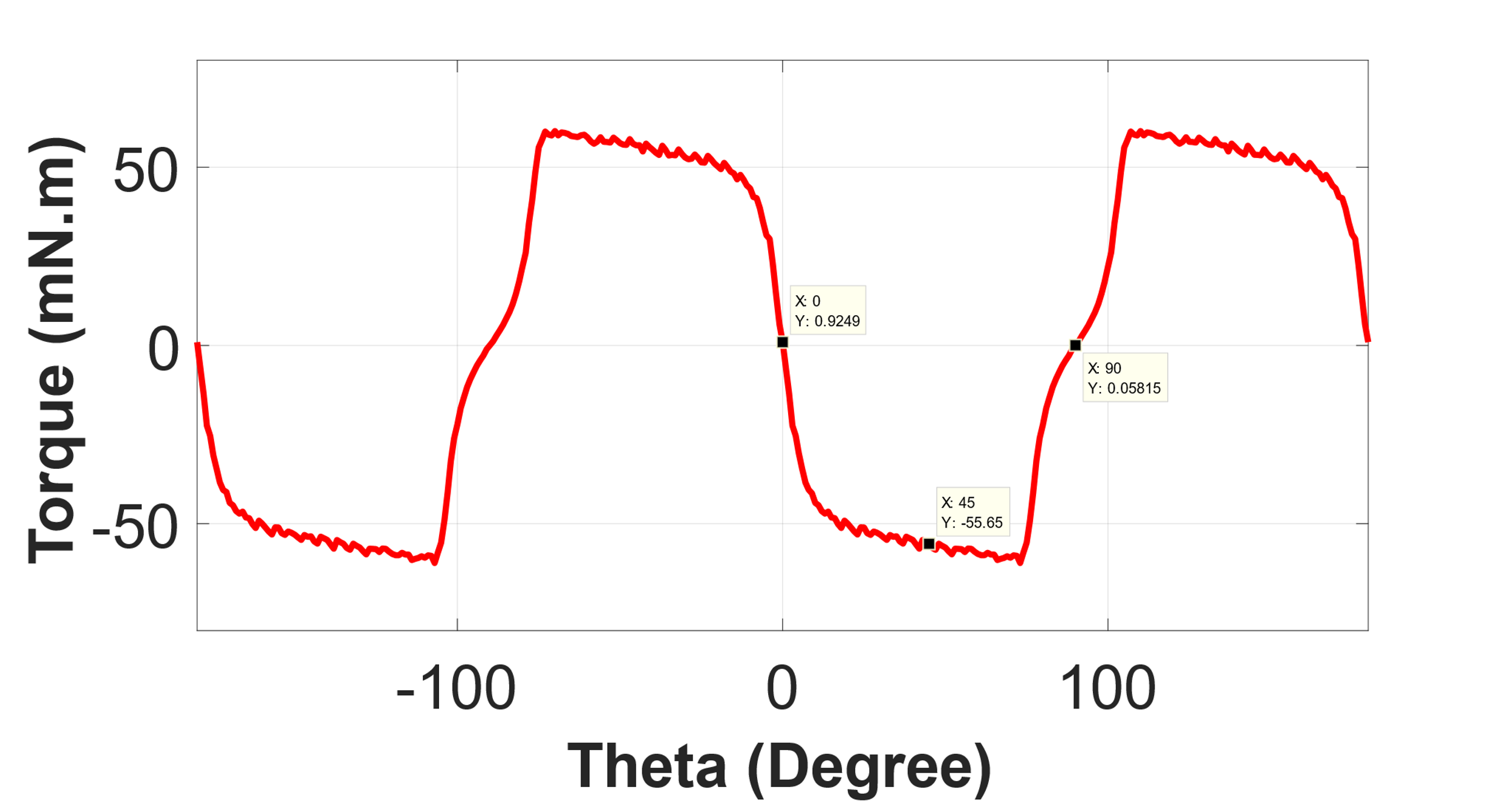


Figure . Torque vs theta waveform of the model with non-linear material

d)