DC motor

2D Application Note Summary

Introduction

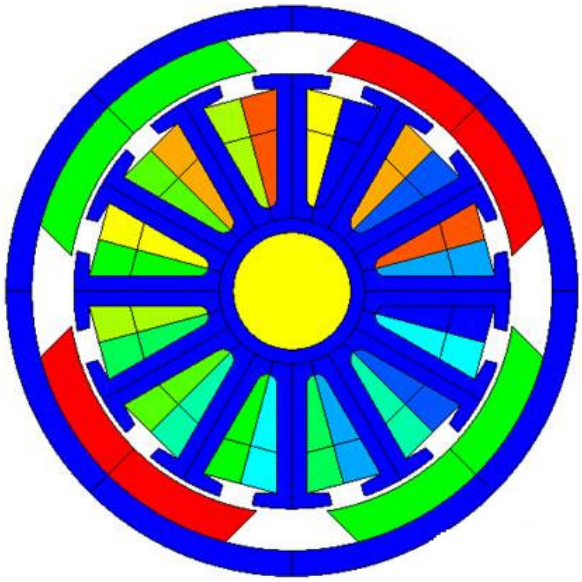
This application note presents the modeling of a DC motor with Flux 2D.

Keywords

Domain	Applications	Flux main functions	Post-processed quantities
• Direct current motor	• Transient magnetic	• Overlay • Circuit coupling • Kin.=imposed speed • Mechanical set	• Back EMF • Ripplie torque

Studied device

The studied device is a DC motor (see figure)

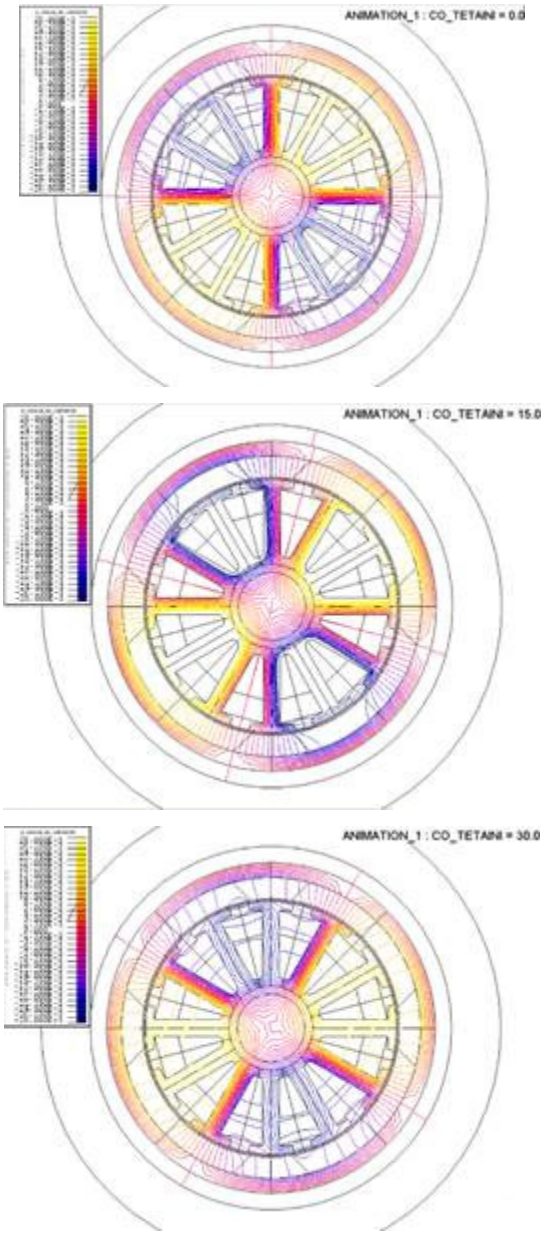


Example 1: Brush angle evaluation

Specific simulation

- At constant speed (close to the working speed)
- Without stator and without magnets (considered as air regions)
- With specific variable for brush initial angle

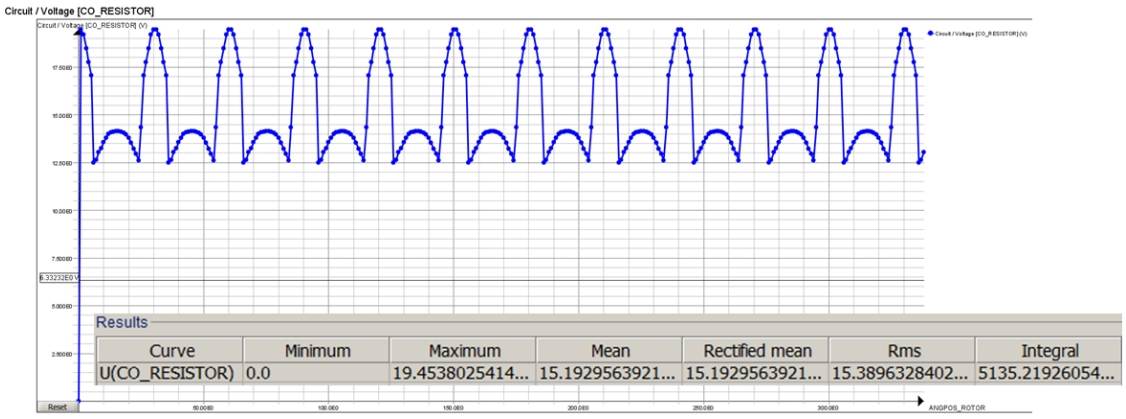
The aim is to display flux density isolines animation and to verify the isolines position on the rotor compared to the isolines position on the stator. According to theory, the rotor flux density should be in quadrature with stator flux density in order to get maximum torque available

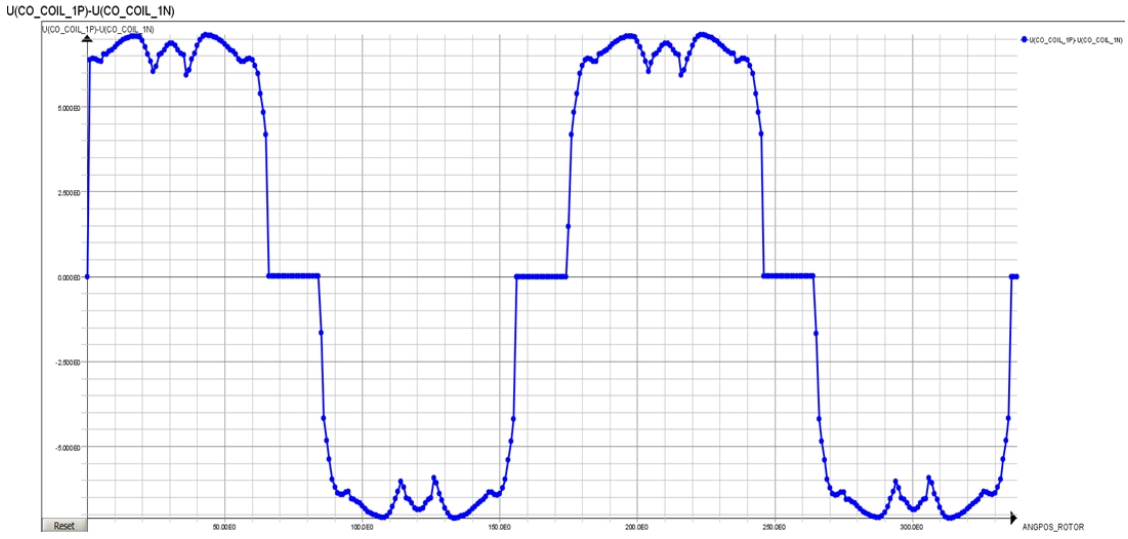


Example 2: Back electromotive force

The back electromotive force EMF is computed with the speed of 10000 rpm and external circuit connections. It corresponds to the motor being in generator mode at no load.

- Compute and display isovalues of the magnetic flux density on face region
- Plot 2D curve of the voltage through coils according to theangular position of the rotor

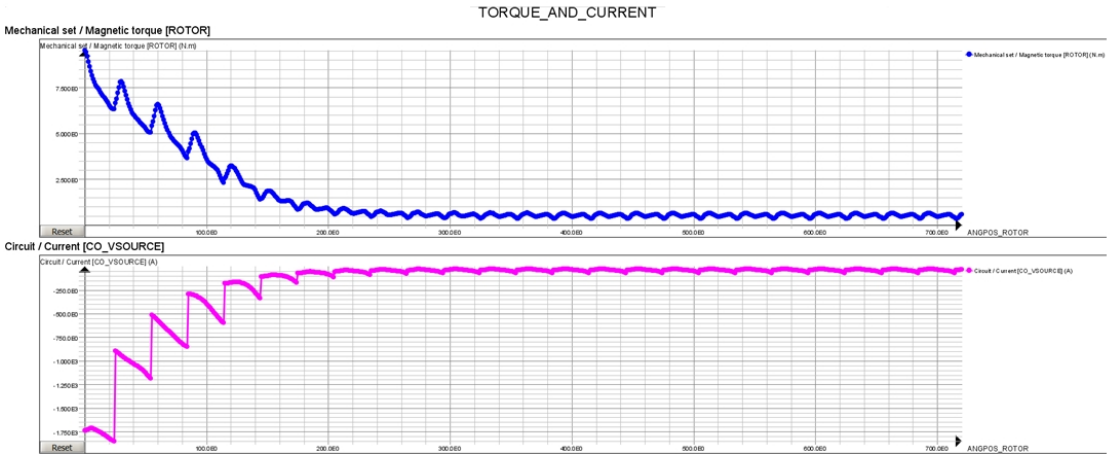


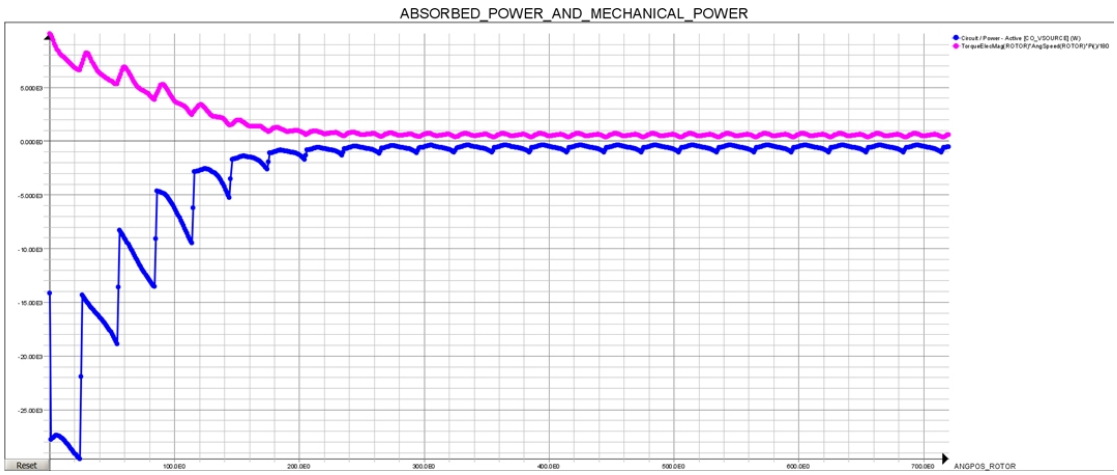


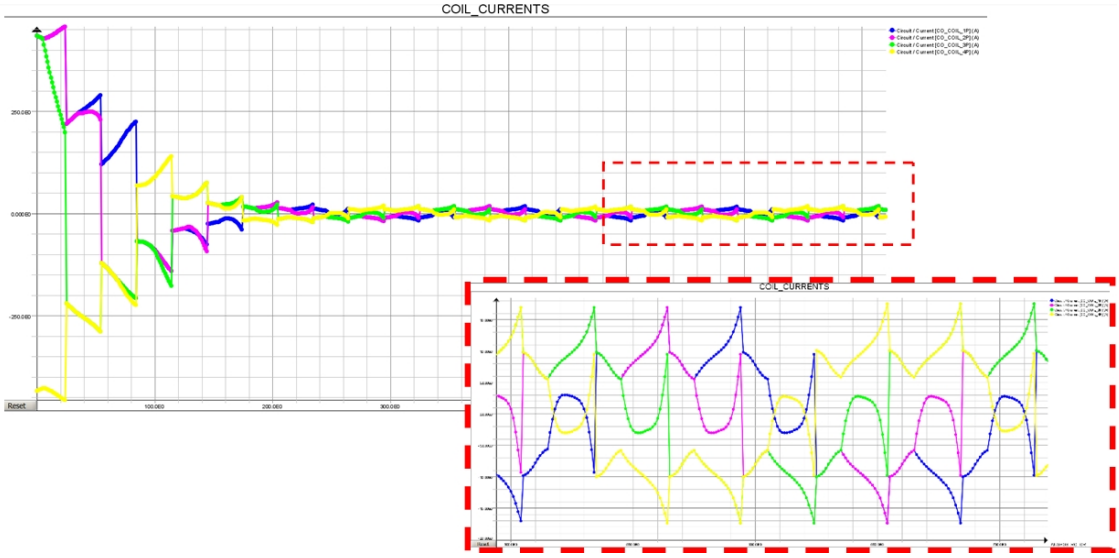
Example 3: Constant speed simulation (10000 rpm)

The aim is to obtain the torque and current ripple

- Plot the absorbed power and mechanical power
- Plot the currents in the coils



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