

Prediction of Motor Bearing Currents for Converter Operation

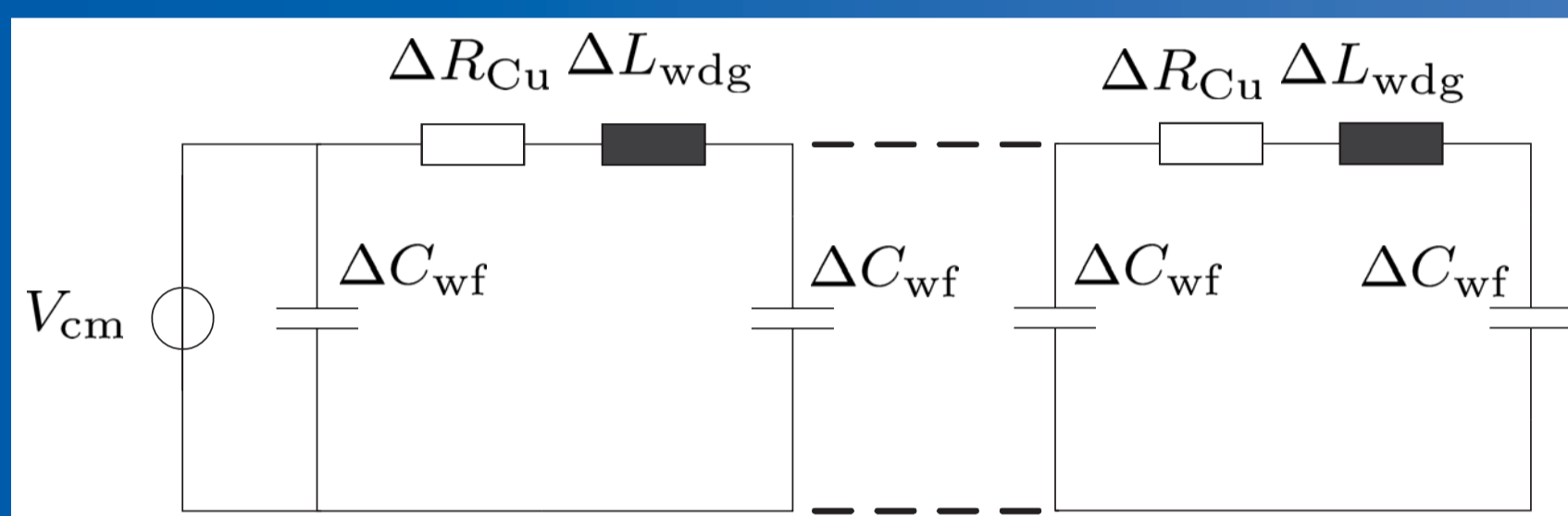
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ICEM 2010

Simulation

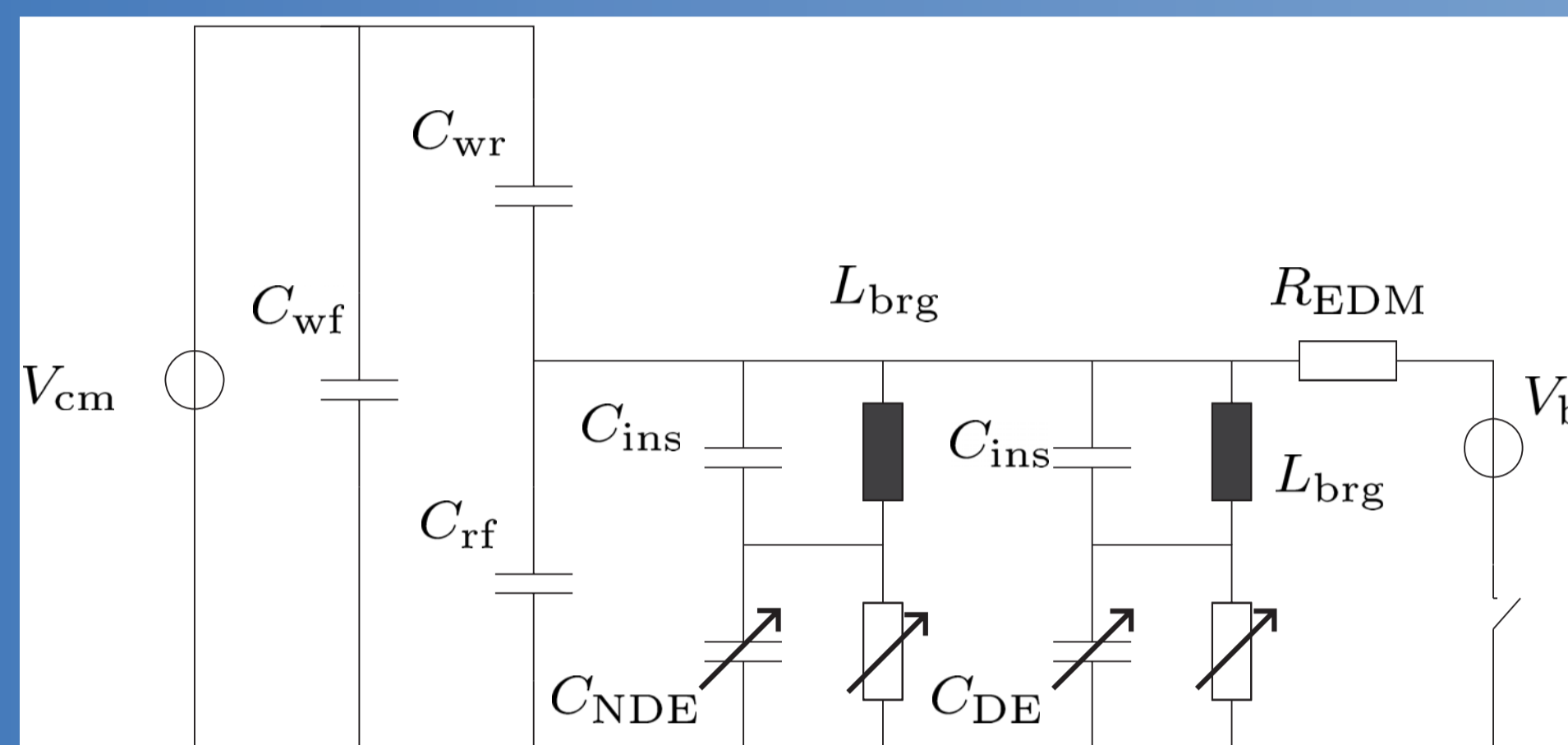
Circular currents

- Lumped parameter network to compute the common mode current
- Parameterized only with motor-geometry
- Inductive coupling between common-mode current and circular current



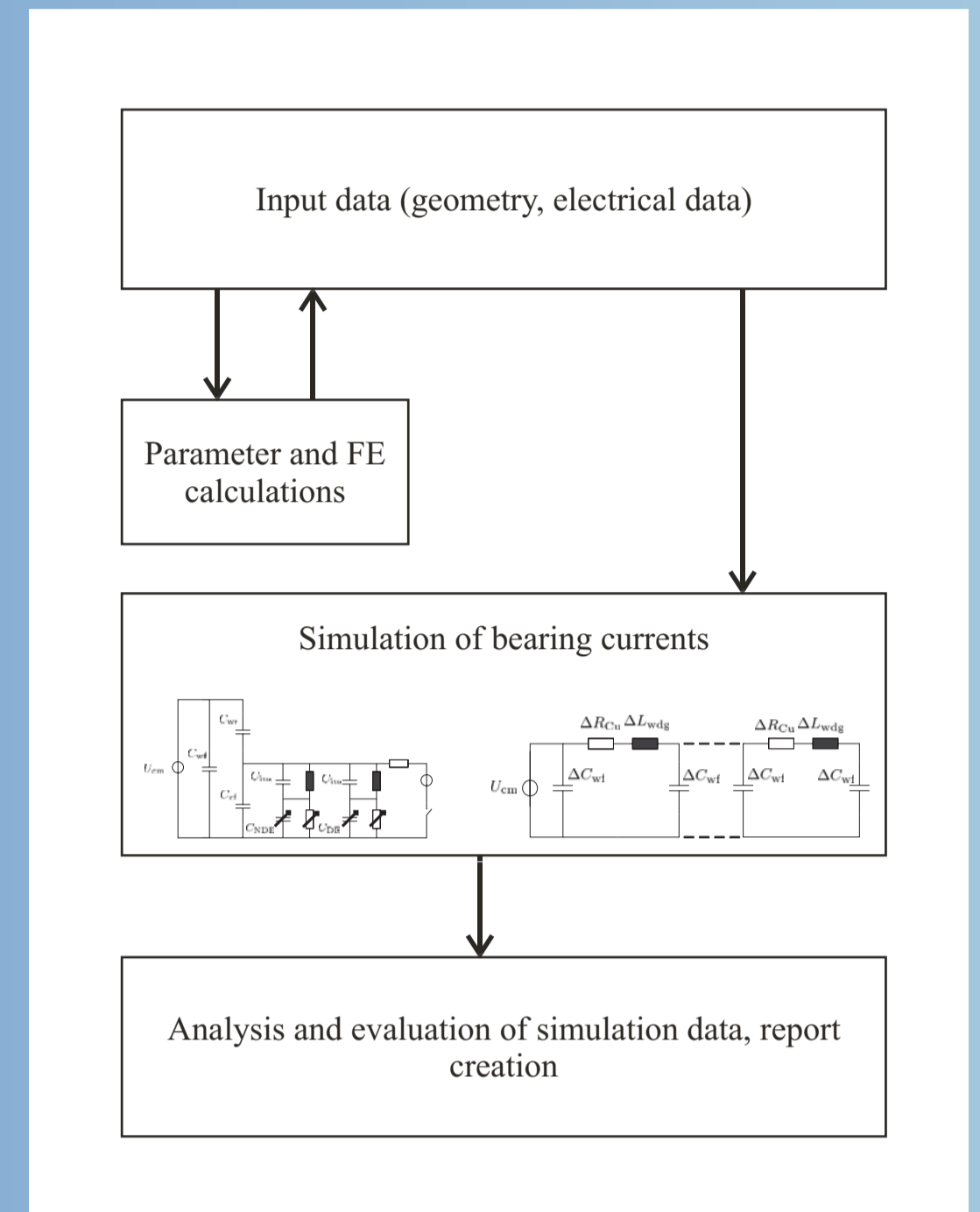
EDM currents

- Capacitive network
- Calculation of EDM currents and BVR
- Nonlinear bearing reactances



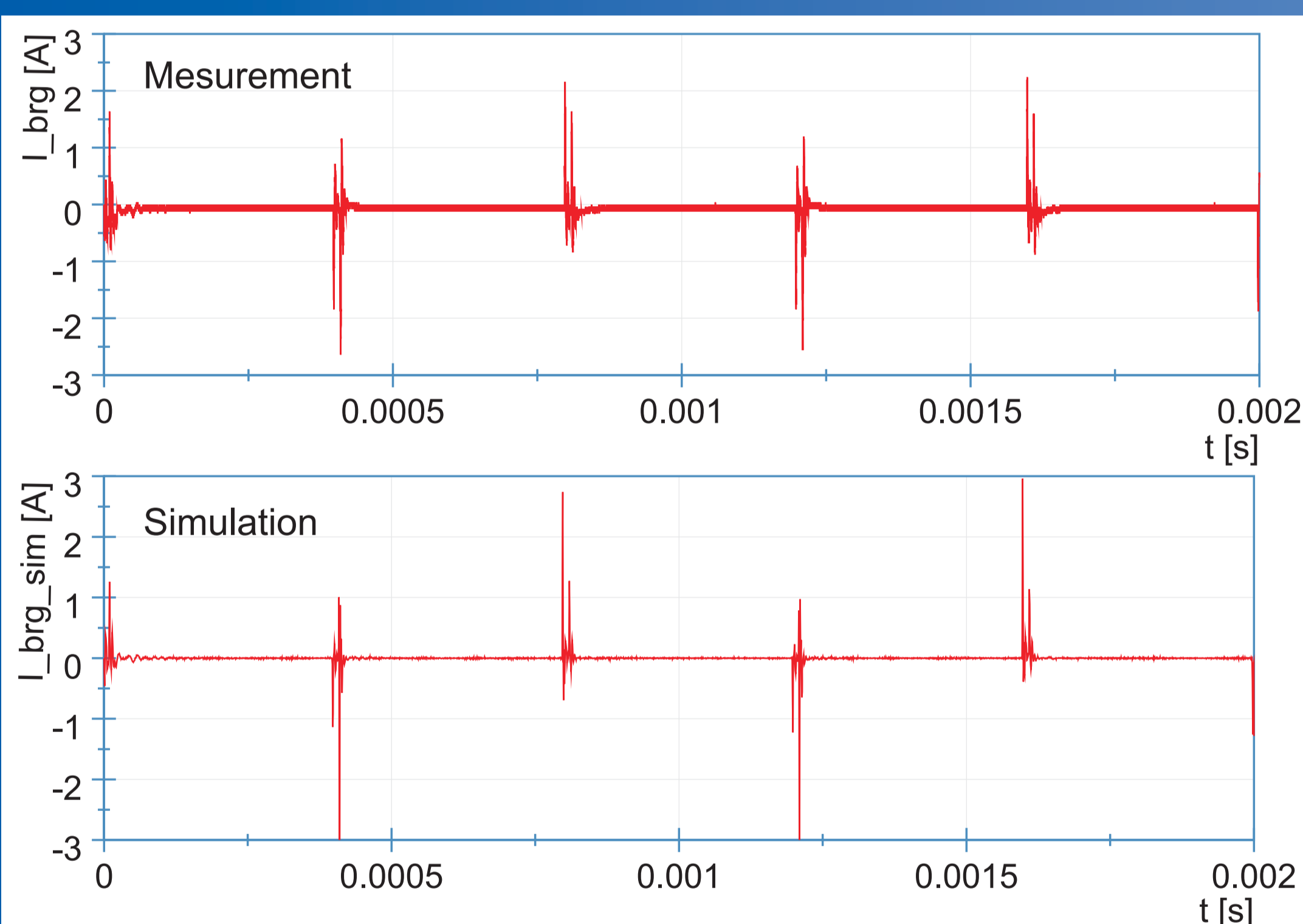
Automated computation

- All applications remote controlled by VBScript
- No need for user actions during all computations
- Automatically generated result file in PDF format

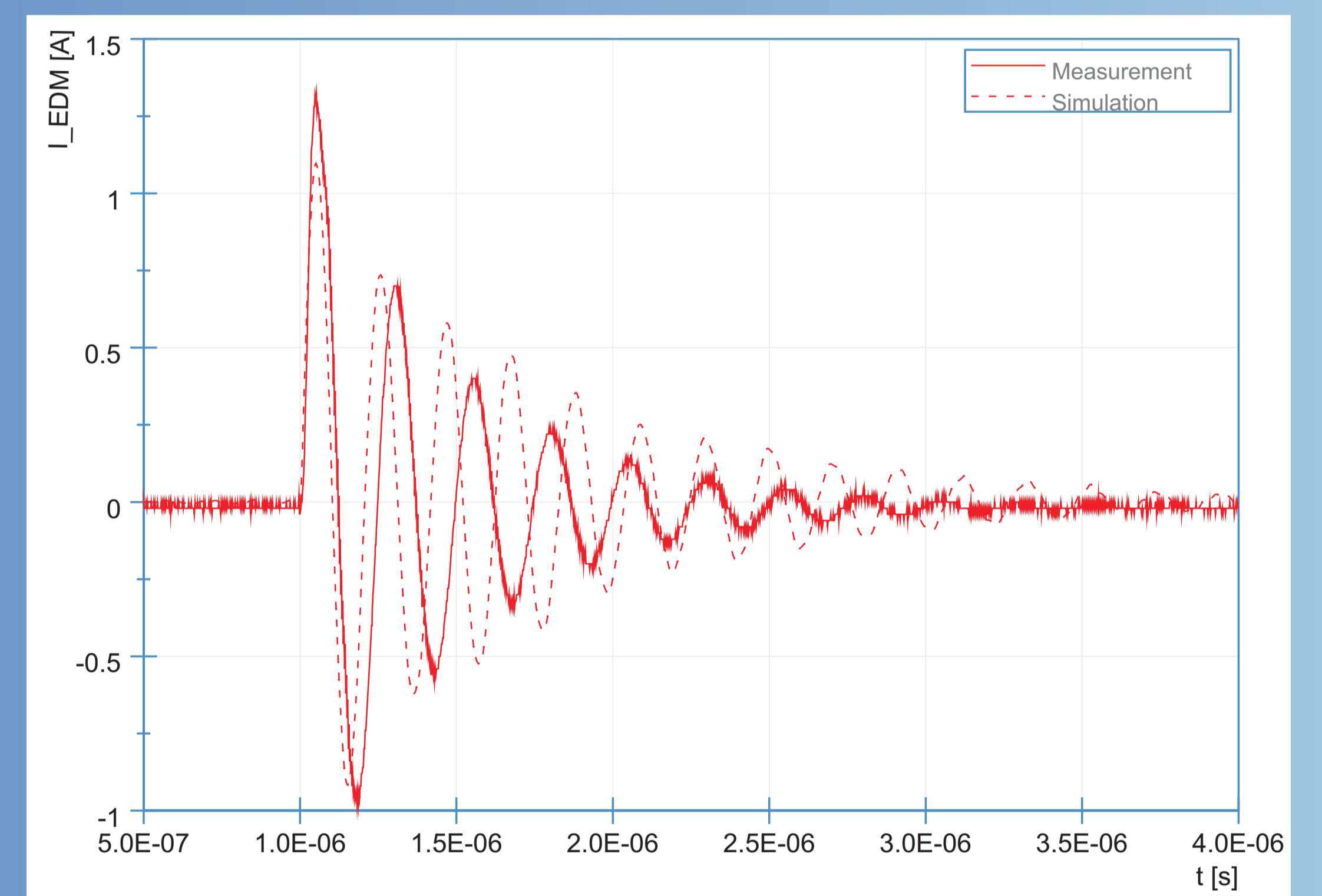


Simulation Results

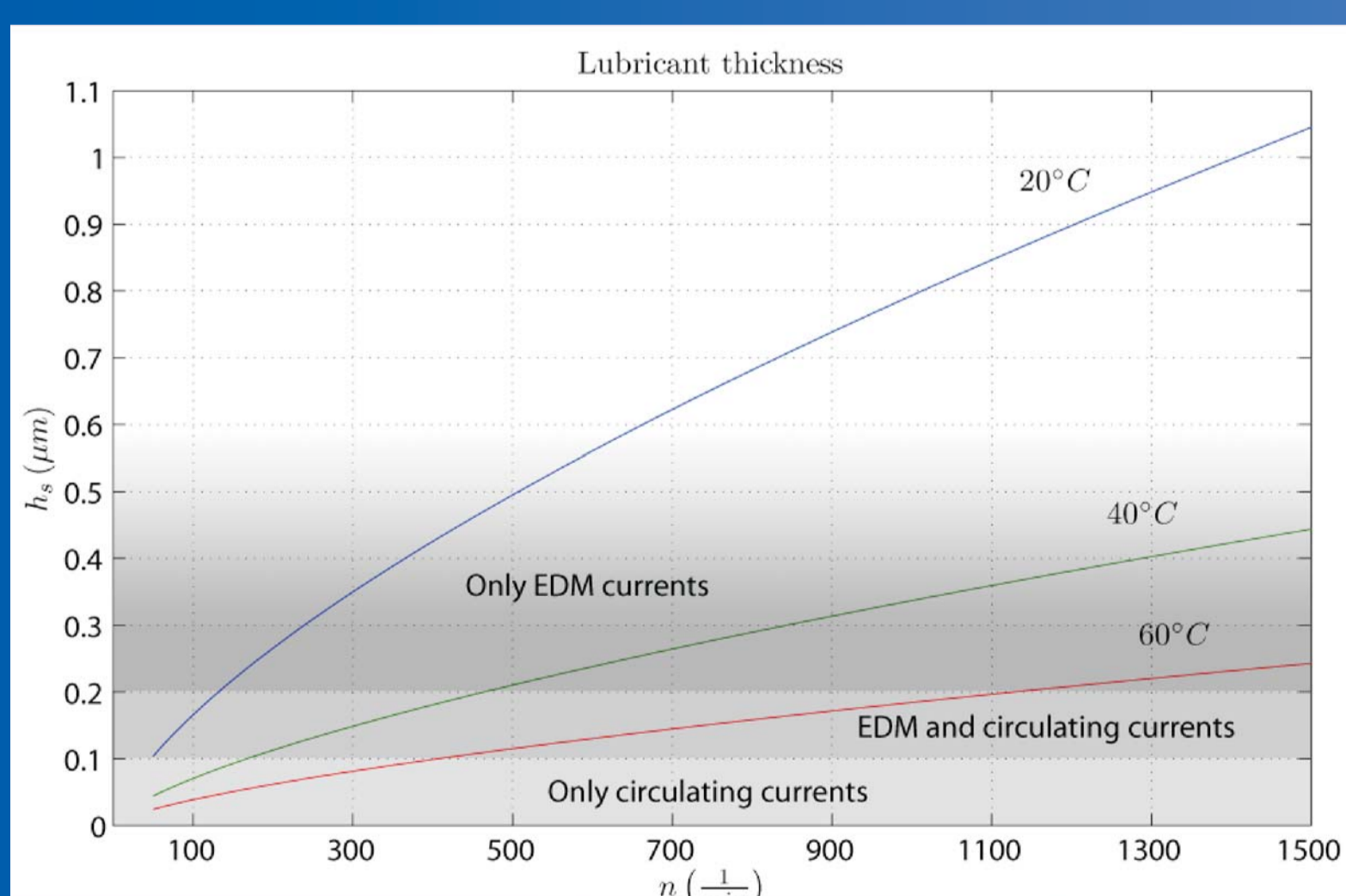
- Circulating currents on a motor with shaft height 315 mm
- Input data: Voltage at the motor terminals and geometrical data of the motor



- Maximum of EDM current can be computed
- Oscillating behaviour due to bearing capacitance and inductive copper bridge for current measurement

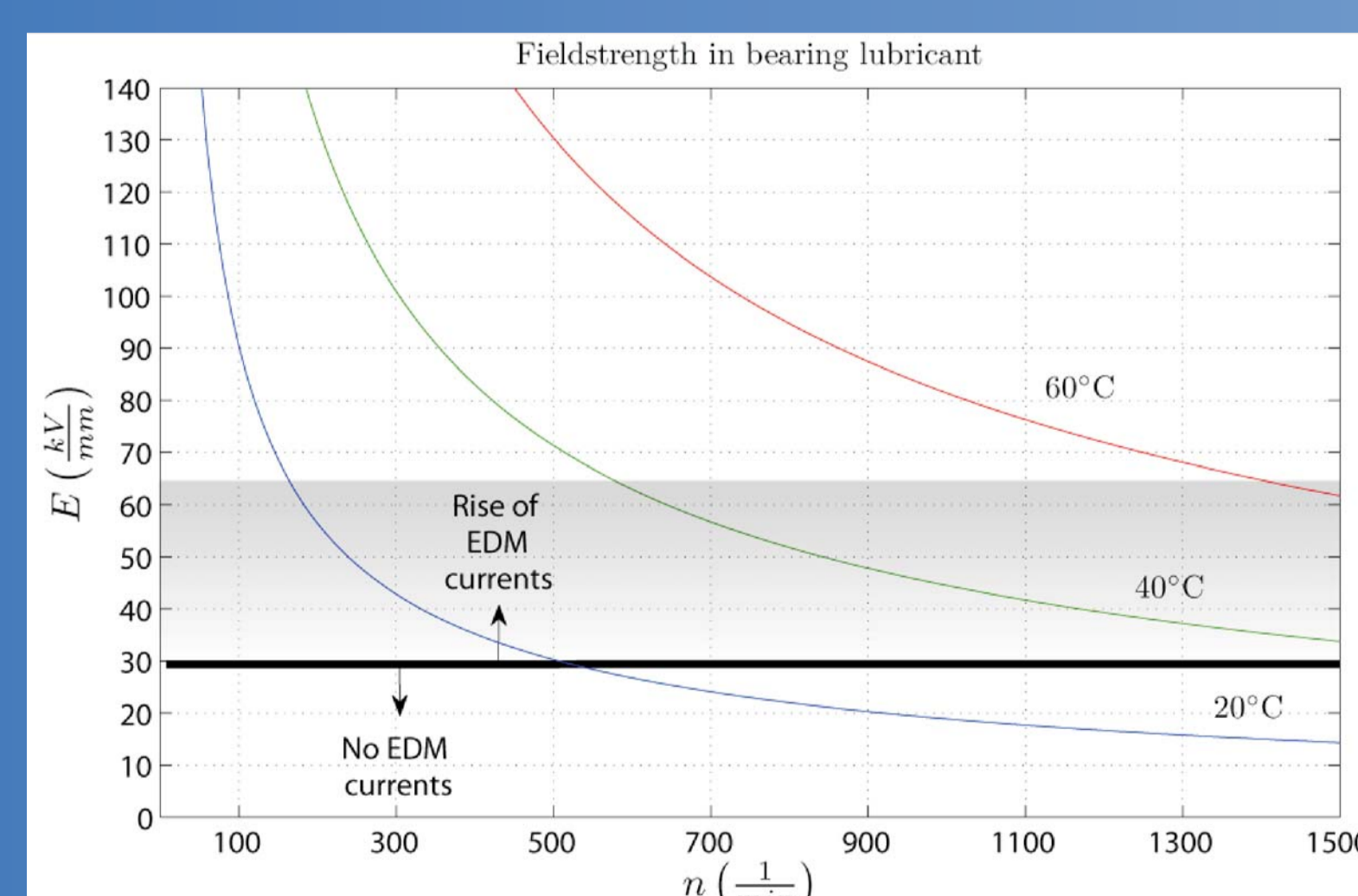


Critical operating points



- Lubricant thickness depends highly on temperature and drive speed

- Threshold value for EDM occurrence
- Electrical field strength indicates the risk of EDM currents



Discussion

- Endurance tests have shown beginning corrugation after 7 days of operation at a critical working point
- Derivation of bearing-life-times

