QuickField Analysis for Electro-Thermal Design

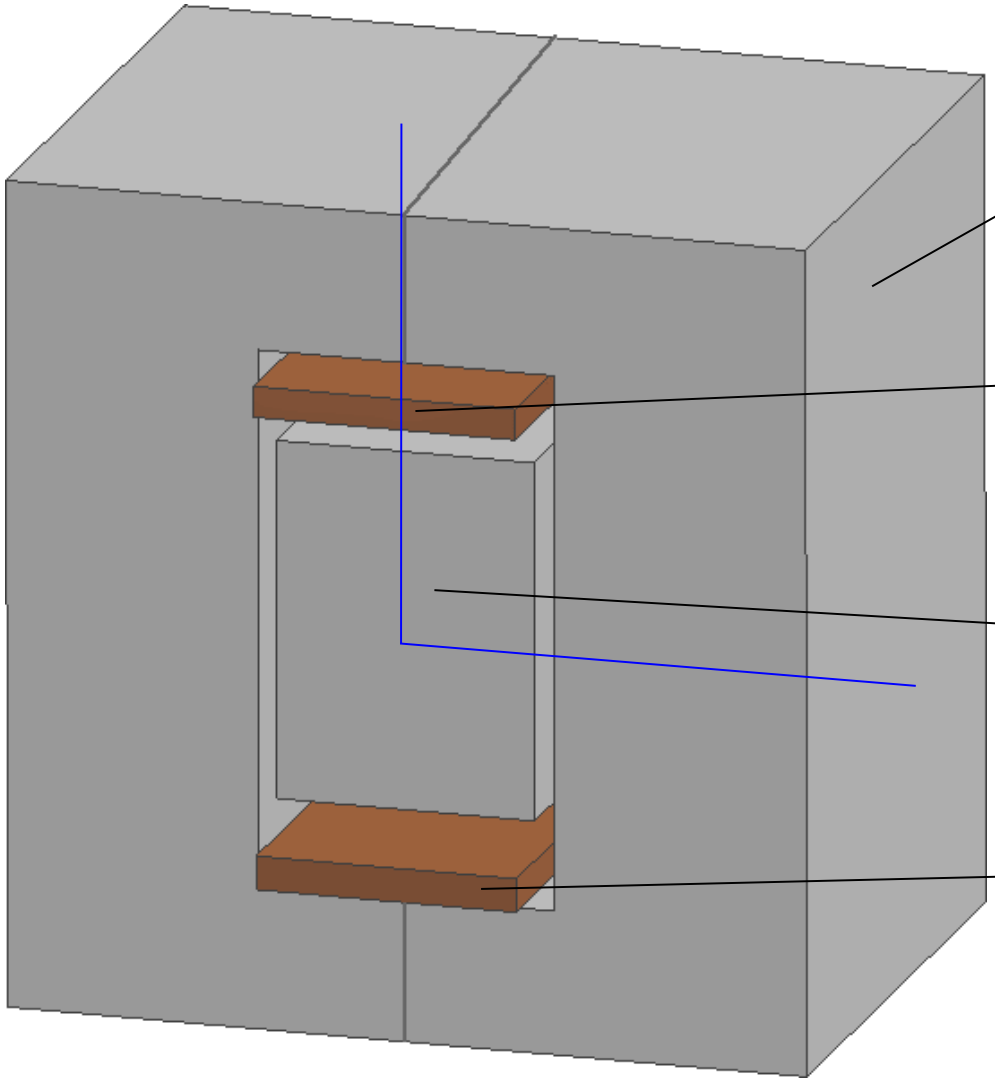
Peter Dickson,
Pac-Rim Engineering Services Inc.

QuickField Analysis for Electro-Thermal Design

Contents

- Front Ends for classes of similar problems
- Creating QF problems
  - Using combined manual entry and automation
- Cross Coupling multi-physics problems
  - with widely different diffusion times
- Splines for non linear properties
  - automatically handling multi-physics variations
- Sequential chains of problems in Time
  - with properties updating in run-time

Today's Example: Ferrite Inductor



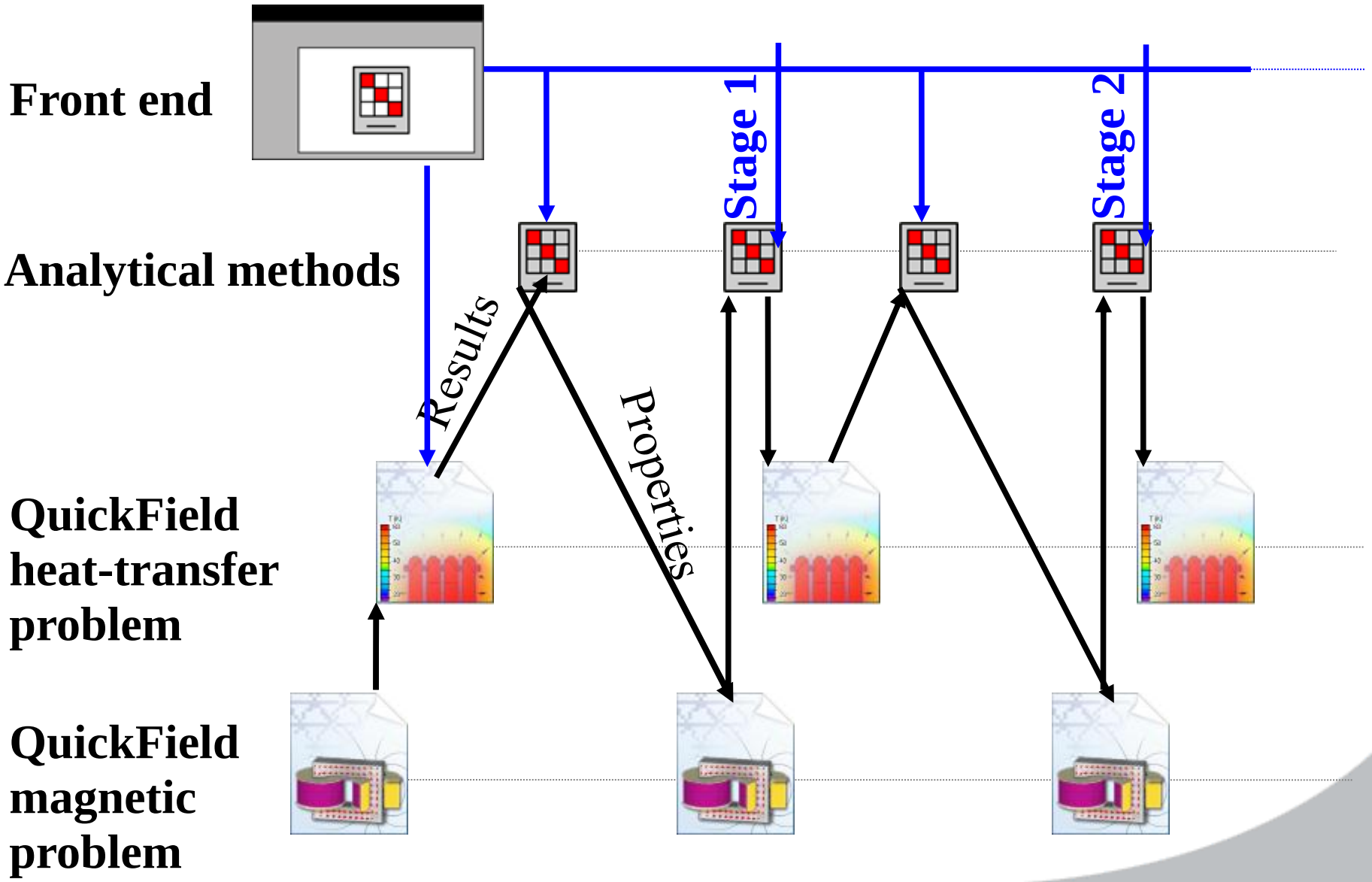
Ferrite outer shell

Copper +

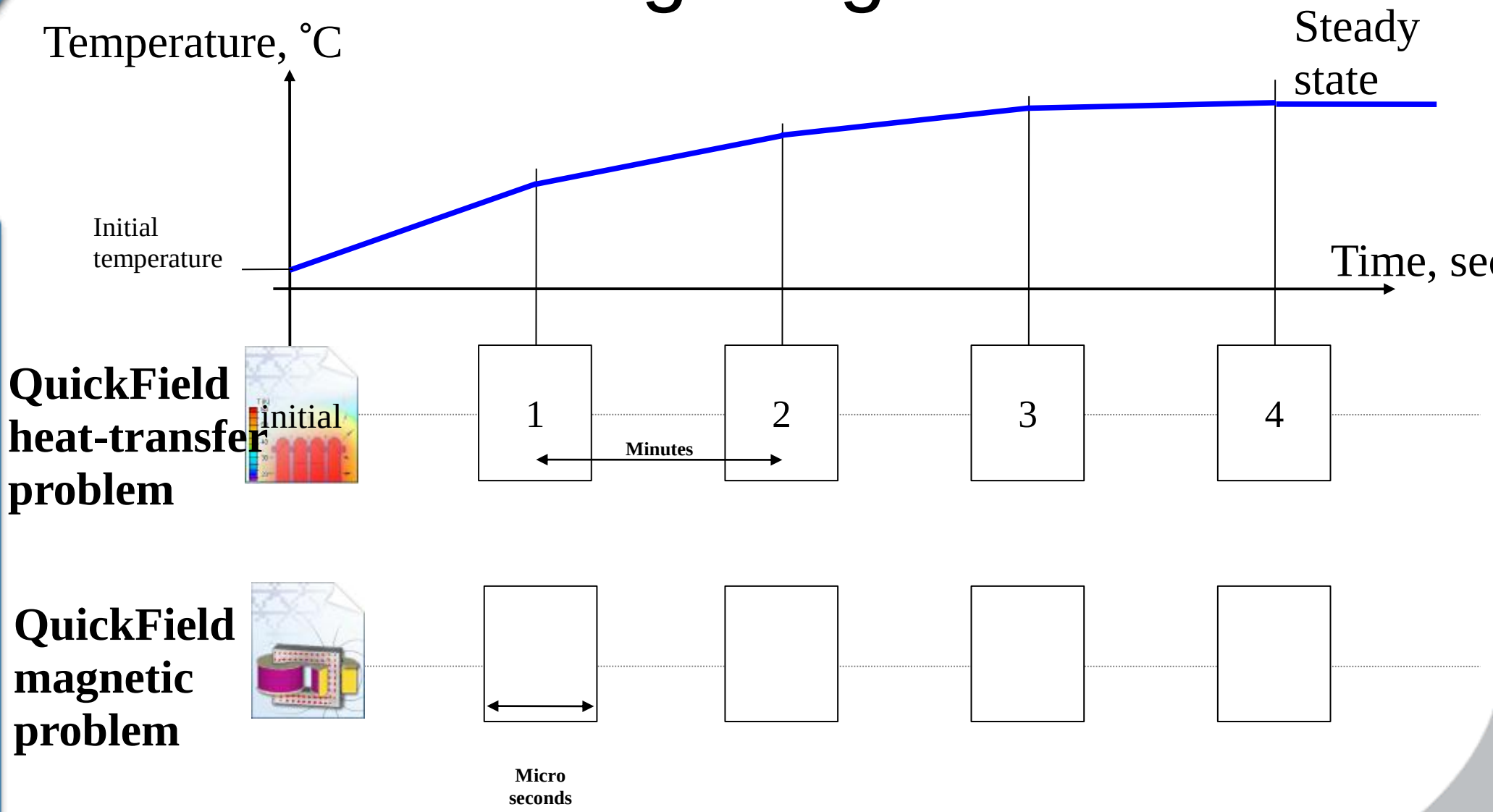
Ferrite inner core

Copper -

Block Diagram

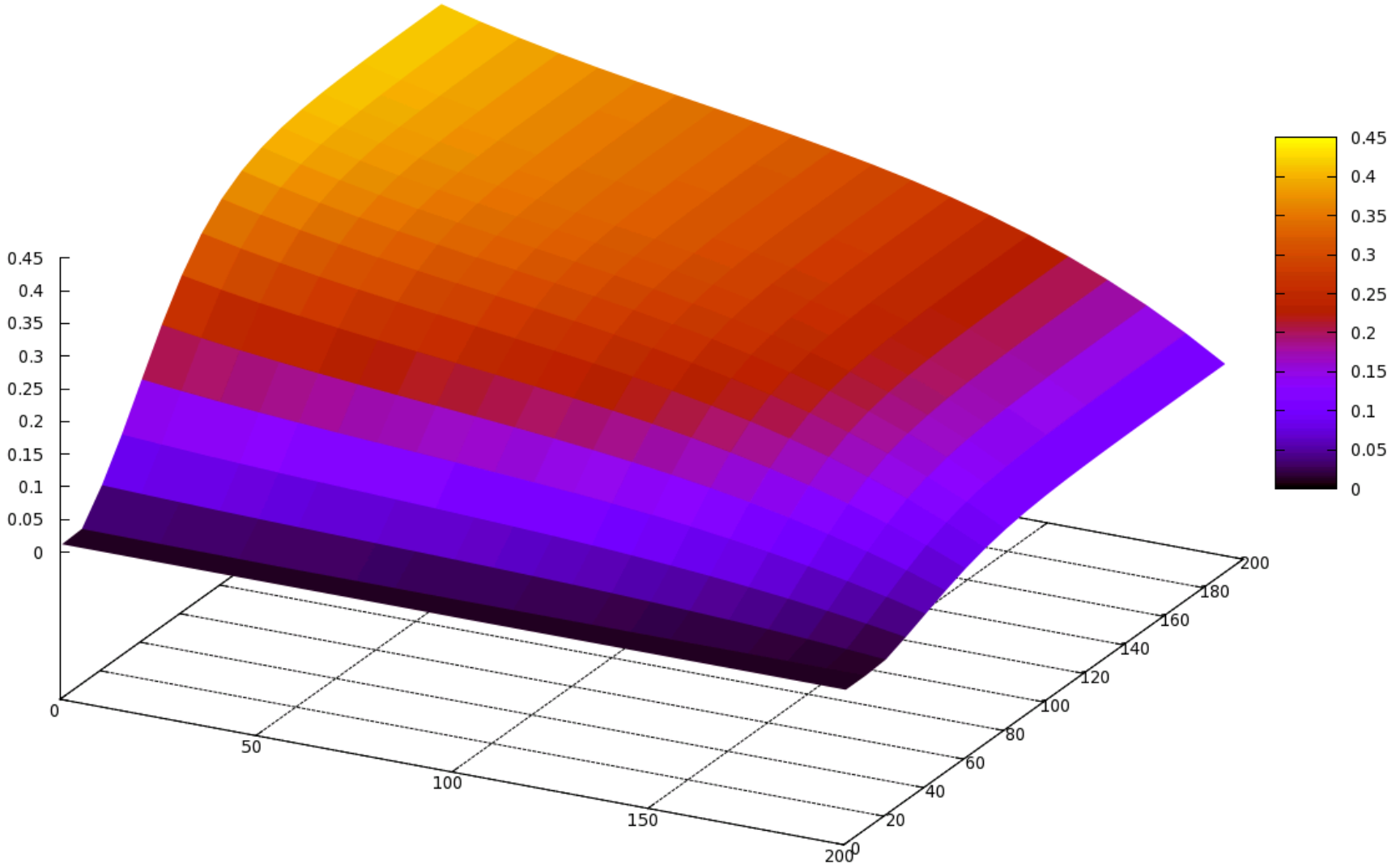


Timing Diagram

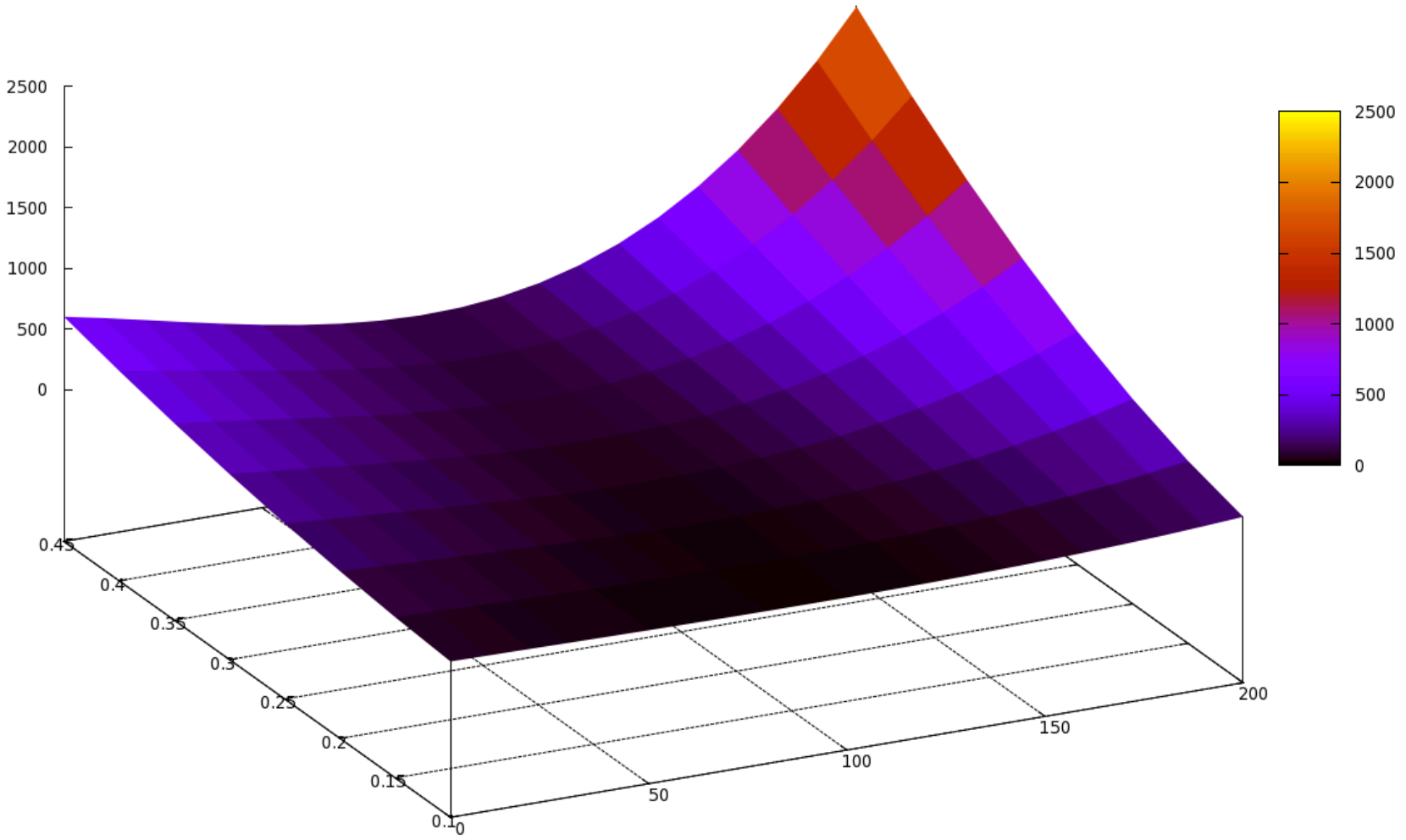


One period of transient magnetic solver is calculated at each stage of the transient heat solvers

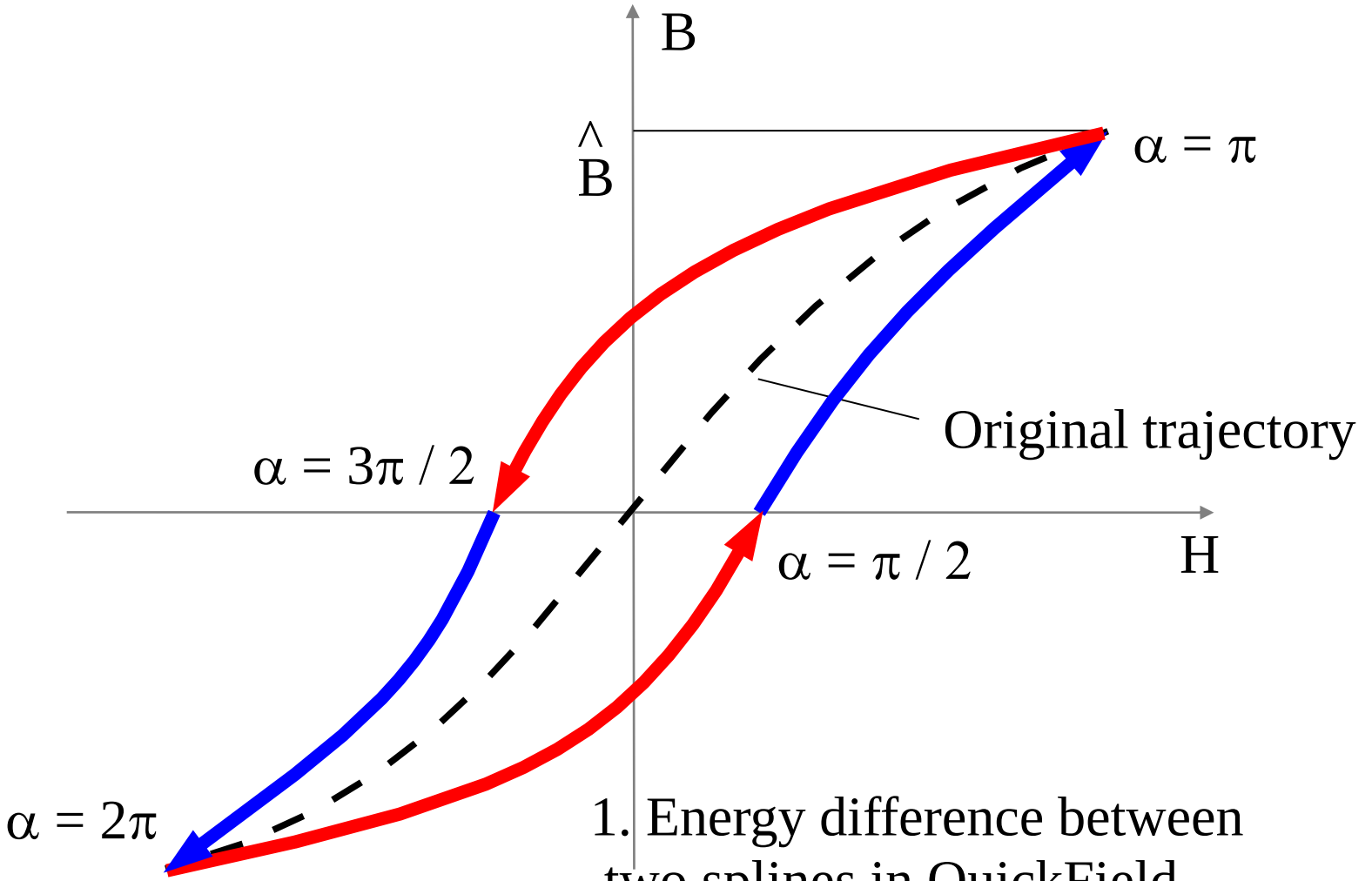
VARIATION of B [T] with H [A/m] & Temperature [C]



VARIATION of loss density [W/m^3] with B [T] & Temperature [C]

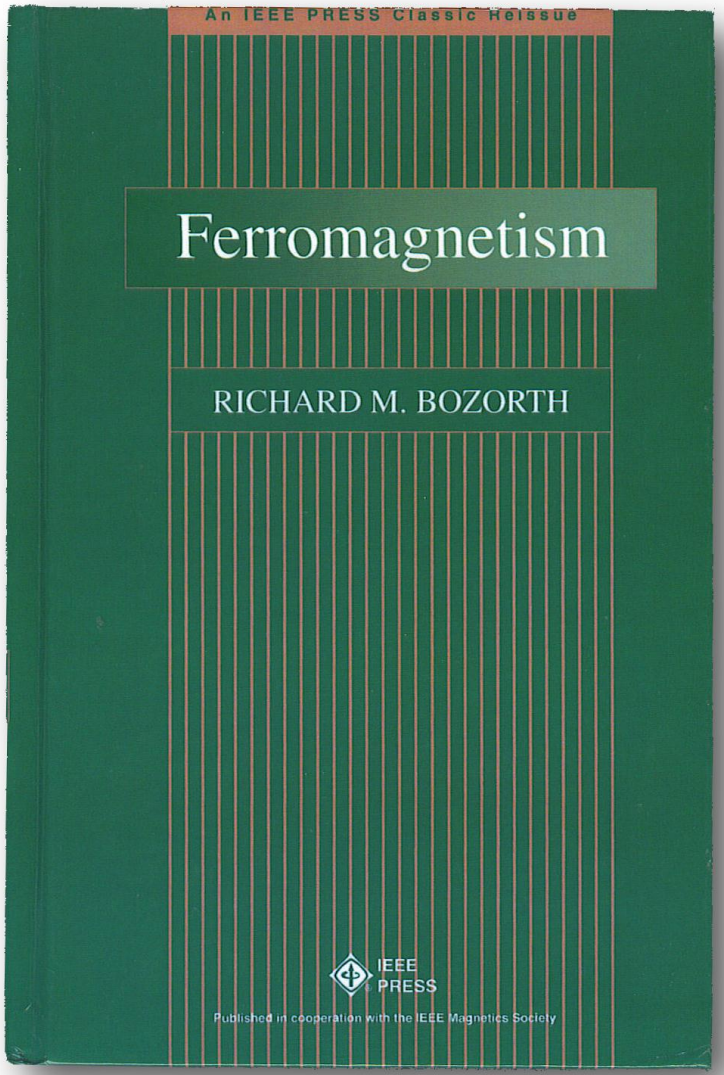


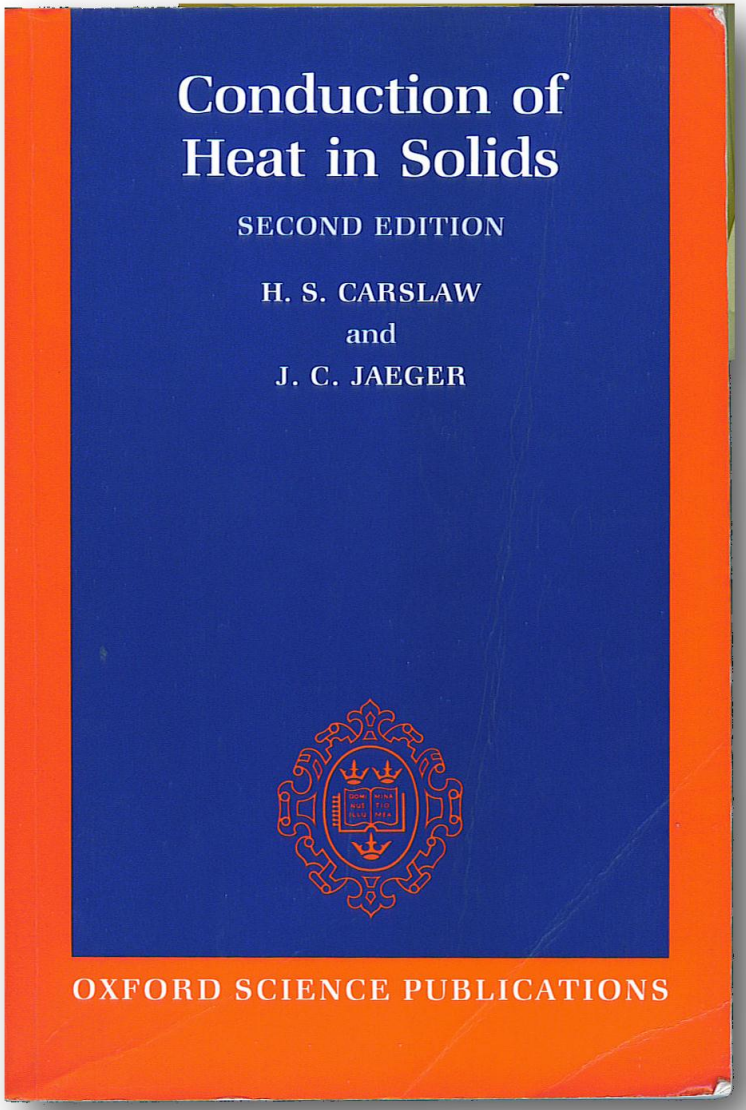
Model for Core Loss



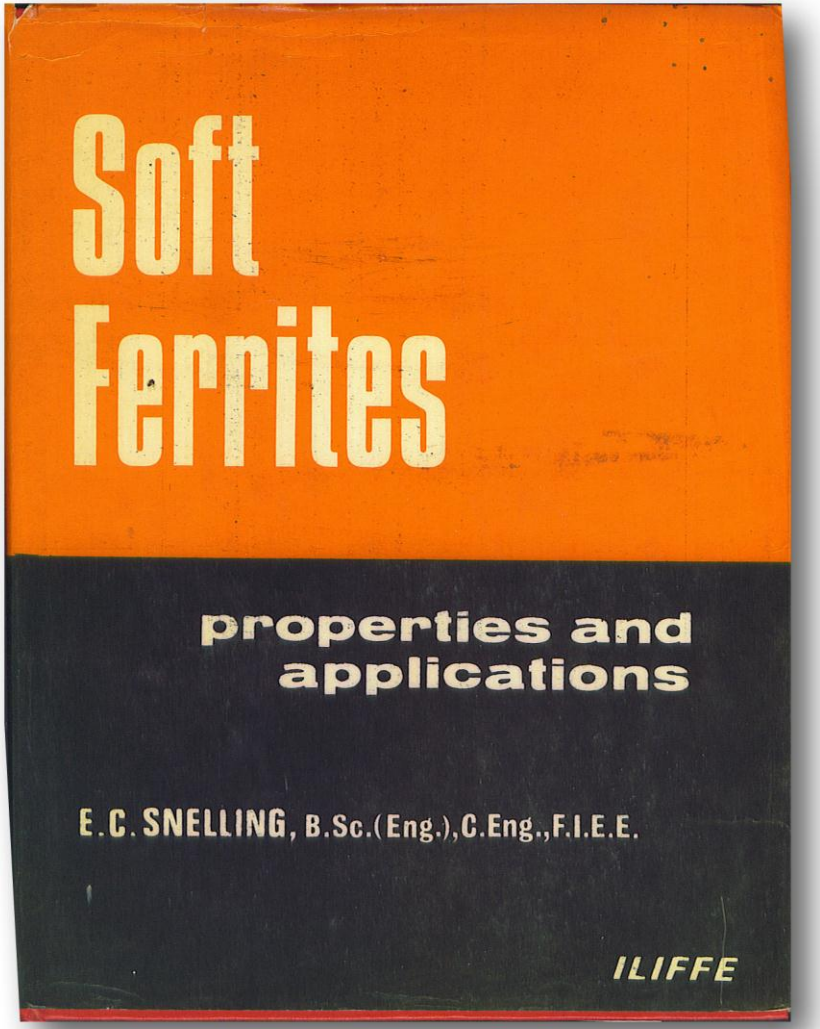
1. Energy difference between two splines in QuickField
2. Steinmetz function and original trajectory (used for this webinar)

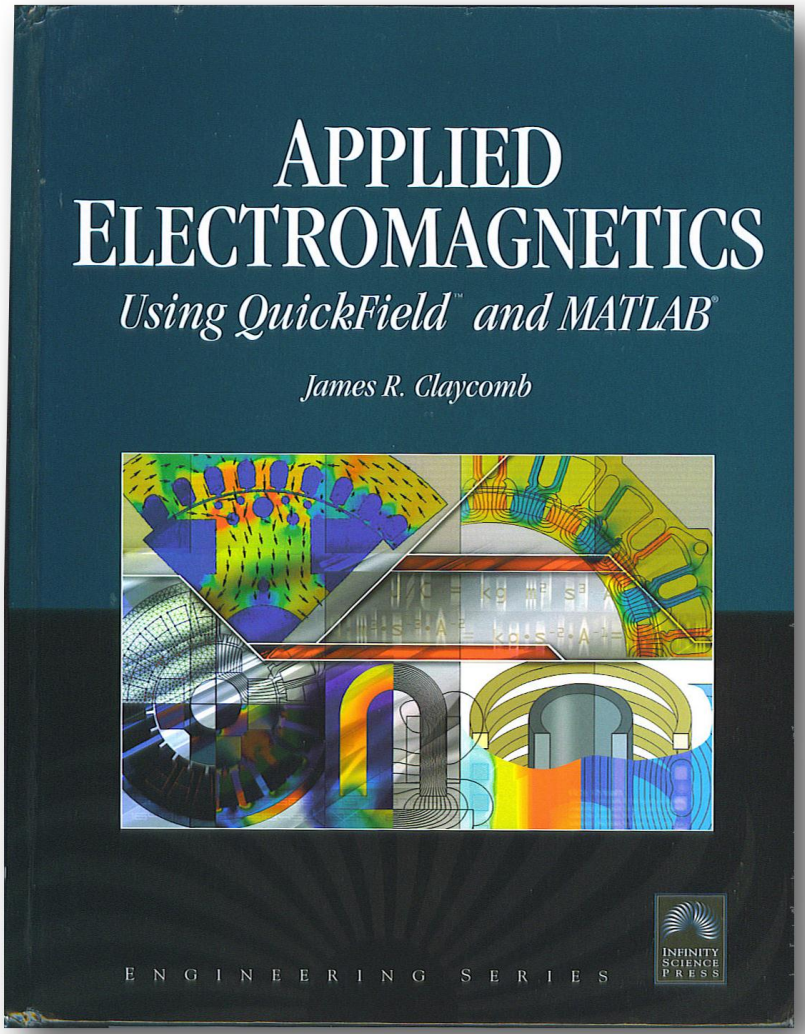
References


An IEEE PRESS Classic Reissue
Ferromagnetism
RICHARD M. BOZORTH
IEEE PRESS
Published in cooperation with the IEEE Magnetics Society


Conduction of Heat in Solids
SECOND EDITION
H. S. CARSLAW
and
J. C. JAEGER
OXFORD SCIENCE PUBLICATIONS

References


Soft
Ferrites
properties and
applications
E.C. SNELLING, B.Sc.(Eng.), C.Eng., F.I.E.E.
ILIFFE


APPLIED
ELECTROMAGNETICS
Using QuickField™ and MATLAB®
James R. Claycomb
ENGINEERING SERIES
INFINITY SCIENCE PRESS