

# Experimental Validation of Induction Heating of MS Tube for Elevated Temperature NDT Application.

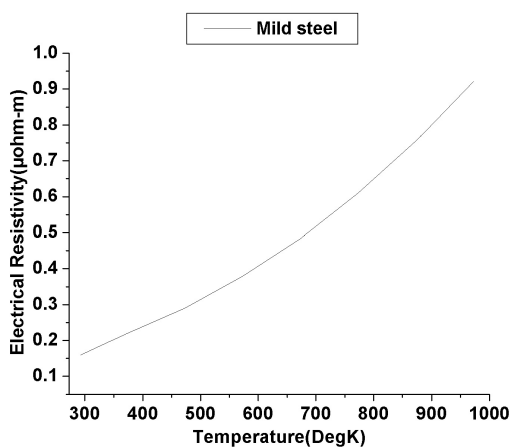
B. Patidar<sup>1</sup>

<sup>1</sup>Bhabha Atomic Research Centre, Mumbai, India

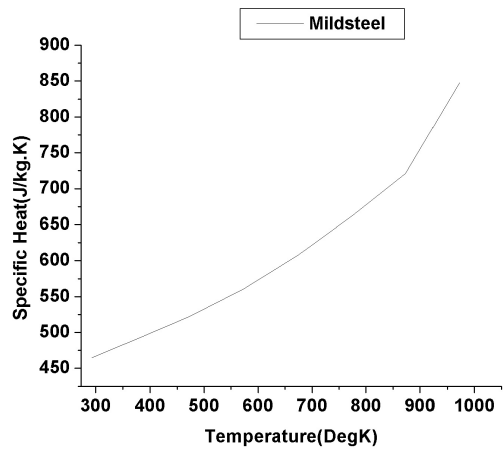
## Abstract

Induction heating is a multiphysics process, which includes electromagnetic induction and heat transfer. Both the physics are nonlinearly coupled with each other. In this paper, Mathematical modeling of induction heating of MS tube for elevated temperature NDT application is presented. Mathematical modeling of electromagnetic field is done by using magnetic vector potential formulation. Heat transfer is represented by using Fourier equation. Temperature dependent material properties like electrical conductivity, magnetic permeability, specific heat, thermal conductivity are considered. Finite element method is used to solve the electromagnetic field and heat transfer equations. Numerical results are compared with experimental results and found that they are in good agreement. Coil equivalent resistance and reactance are computed at different frequency. This analysis can be applied for design and optimization of induction coil for forging and melting applications also.

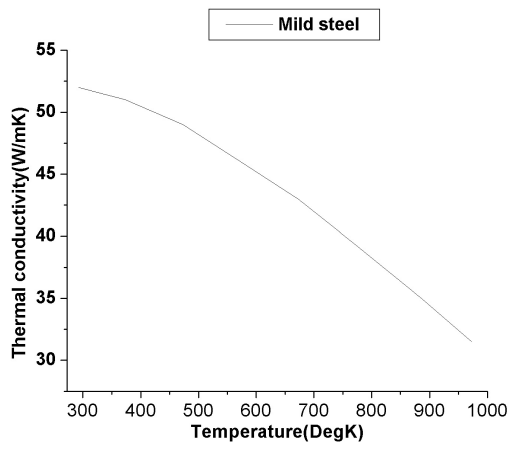
## Figures used in the abstract



**Figure 1:** Mild Steel Resistivity as Function of Temperature.



**Figure 2:** Mild Steel Specific Heat as Function of Temperature.



**Figure 3:** Mild Steel Thermal Conductivity as Function of Temperature.