



# SIMPLIFIED 2D TRANSIENT HEAT TRANSFER SIMULATION USING GAUSS ERROR FUNCTION AND FDM

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## **Abstract**

This Article documents the methodology used to compile a transient heat transfer simulation with the goal of calculating the time to full solidification or any specified temperature of a metal casting, this simulation may serve as a confirmation of Chvorinov's rule, furthermore the simulation will identify the heat transfer topography, allowing the user to identify the location of possible solidification errors, however for the purpose of simplification, only the liquid phase cooling of pure iron will be considered in this report. Euler methods will be discussed with special attention paid to explicit forward approximation and how Gaussian error can be used to simplify the simulation, in an attempt to reduce processing time. A look at the advantages and disadvantages of using this method will be considered and explanations given the decisions taken in the methodology of the simulation, the use of software will be discussed. The article will conclude with a look at the other applications for this simulation as well as the limits of this simulation.

**Keywords:** Euler, solidification, Chvorinov, Gauss-error, simulation.

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