Chapter 12.1 - The Heat Conduction Equation

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date:

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Introduction

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Previous sections assumed systems were in thermal equilibrium, as such time $t$ was not taken into account with distance $x$.

- $U(x) \rightarrow U(x, t)$

- $J(x) \rightarrow J(x, t)$

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<img src="./usgsimage.jpeg" height=600px width=900px />

Formulating a PDE

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### Heat Flow through a Wall

- Word Equation from Section 9.5:

$$

\begin{equation}

\begin{Bmatrix}

\mathrm{rate \, of } \\

\mathrm{change \, of} \\

\mathrm{heat \, in \, section} \\

\end{Bmatrix}

=

\begin{Bmatrix}

\mathrm{rate \, heat} \\

\mathrm{conducted} \\

\mathrm{in\, at\, x} \\

\end{Bmatrix}

-

\begin{Bmatrix}

\mathrm{rate\, heat} \\

\mathrm{conducted} \\

\mathrm{out \, at \, x+\Delta x} \\

\end{Bmatrix}

\end{equation}

$$