

# Phase Detector Project

## Problem Statement

In thermodynamics, determining the phase of a substance (compressed liquid, two-phase mixture, or superheated vapor) is essential for analyzing systems such as power plants, refrigeration, and heating systems. Typically, engineers use steam tables or thermodynamic charts to manually compare temperature and pressure data with saturation values. This process can be time-consuming and prone to human error.

## Application of the Code

The provided Python program simplifies this process by offering a graphical user interface (GUI) to determine the phase of water based on user-input temperature and pressure values. The code integrates pre-defined saturation data for water, allowing users to compare inputs against saturation lines. The program then outputs whether the substance is in the compressed liquid, superheated vapor, or two-phase mixture region. This tool is useful for students, educators, and engineers working on thermodynamic problems.

## Key Features

- Simple and intuitive Tkinter-based GUI
- Input options by temperature or pressure
- Built-in saturation data for water
- Instant results without manual table lookup
- Educational tool for learning thermodynamics
- Lightweight and easy to run on any system with Python