**Thermodynamic Process Simulation**

LAB 1

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Aim

*This MatLab code simulates a thermodynamic process involving three stages i.e isothermal,constant volume , and adiabatic. The process is represented on pressure-volume(PV) diagrams for each stage.*

*The purpose of this simulation is to analyze and visualize the behaviour of gas undergoing these different processes. The code contains basic thermodynamic equations and principles to compute various paramaeters such as work,heat,and enthalpy for each process.*

Methodology

1. ***Steps, calculation procedure:***

*The code begins by defining initial parameters such as the number of moles (n), gas constant (R), specific heat capacities (Cv and Cp), and initial and final temperatures (T1 and T2). The volumes (V1 and V2) and pressures (P1 and P2) are then calculated based on the ideal gas law. Three processes are simulated: isothermal, constant volume, and adiabatic. The steps involve plotting the PV diagrams for each process and calculating thermodynamic quantities such as work, internal energy, heat, and enthalpy.*

1. ***Graphs and Comparisions***

*Process 1 (Isothermal): The PV diagram shows a hyperbolic curve, indicating an isothermal process. The work is calculated using the ideal gas law and logarithmic relationship between volumes, resulting in a negative work value.*

*Process 2 (Constant Volume): Represented by a vertical line on the PV diagram(\*\*not in my code though), indicating constant volume. The work done is zero as the volume remains constant.*

*Process 3 (Adiabatic): The PV diagram displays an adiabatic expansion followed by a constant pressure process. The peak pressure (P2) and corresponding temperature (T2) are calculated. The adiabatic portion is described by the relation between volume and pressure.*

*The whole code could be made more interesting and attractive by adding some functions which can be used in different codes as well to determine particular kind of process work ,enthalpy and internal energy . We could also enable the user to enter the parameters as per his/her wish so that he/she can alter the questions without the need of changing the code.*

Graph:

Conclusions:

*In conclusion, the simulation successfully illustrates the behavior of a gas undergoing different thermodynamic processes. The isothermal process involves negative work due to volume expansion, the constant volume process exhibits zero work, and the adiabatic process includes both expansion and constant pressure phases. The calculated values for work, internal energy, heat, and enthalpy provide insights into the thermodynamic aspects of each process.*

Appendix: