**Review Form2**

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| Book Name: | Current Research Progress in Physical Science |
| Manuscript Number: | **Ms_BPR_2682** |
| Title of the Manuscript: | **Molecular hydrodynamic: A physical approaches** |
| Type of the Article | **Book chapter** |

**PART 1: Review Comments**

| **Compulsory** REVISION comments | **Reviewer's comment** | **Author's Feedback***(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
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| **Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimumof 3-4 sentences may be required for this part.** | | |
| **Is the title of the article suitable?<br>(If not please suggest an alternative title)** | | |
| **Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.** | | |
| **Are subsections and structure of the manuscript appropriate?** | | |
| **Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimumof 3-4 sentences may be required for this part.** | | |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.<br>-** | | |

**Review Form2**

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| Minor REVISION comments<br><br>**Is the language/English quality of the article suitable for scholarly communications?** | | |
| **Optional/General**comments | **Hydrodynamic and Molecular Interaction:**<br>• How does the interaction between hydrodynamic flow and molecular dynamics influence the overall gas flow behavior in the system?<br>**Hydrodynamic Degrees of Freedom:**<br>• Can you elaborate on the concept of the hydrodynamic degree of freedom introduced in this context, and how it applies specifically to water vapor flow?<br>**Experimental Setup:**<br>• What are the specific experimental conditions (e.g., pressure, temperature) under which the unusual behavior of adjacent vapor samples is observed?<br>**Weak Discontinuity:**<br>• What defines the weak discontinuity in the context of gas discharge, and how does it differ from strong discontinuity or shock waves?<br>**Molecular Physics Interpretation:**<br>• How does the molecular interpretation of Euler's equation differ from the classical hydrodynamic approach in explaining gas discharge behavior?<br>**Valve Dynamics:**<br>• What role does the valve operation play in creating the weak discontinuity, and how does its speed or position affect the flow properties?<br>**Flow Regime Transition:**<br>• At what point does the flow transition from a molecular to a hydrodynamic regime, and what factors influence this transition?<br>**Boundary Layer Formation:**<br>• How does boundary layer formation between the two vessels influence the overall flow dynamics and behavior of the vapor?<br>**Knudsen Number Analysis:** | |

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| | • What is the significance of the Knudsen number in this setup, and how does it govern whether the flow is dominated by molecular or hydrodynamic processes?<br><br>**Water Vapor Specificity:**<br><br>• Why do water vapor samples exhibit such unusual behavior in comparison to other gases, and what role does molecular polarity or hydrogen bonding play?<br><br>**Pressure and Flow Relation:**<br><br>• How does the pressure differential between the two vessels influence the velocity and characteristics of the gas flow?<br><br>**Non-equilibrium Effects:**<br><br>• What non-equilibrium effects come into play during the transition of gas between vessels, especially at the molecular level?<br><br>**Role of Temperature Gradients:**<br><br>• How do temperature gradients between the two vessels affect the molecular velocity distribution and hydrodynamic flow patterns?<br><br>**Diffusion vs. Advection:**<br><br>• In this system, how do diffusion and advection compete or complement each other in determining the behavior of the vapor flow?<br><br>**Energy Dissipation Mechanisms:**<br><br>• What are the primary mechanisms of energy dissipation in this system, particularly when considering both hydrodynamic and molecular contributions?<br><br>**Vapor Condensation Effects:**<br><br>• How does the potential for condensation of water vapor in this system influence the flow behavior and adjacent vapor sample interactions?<br><br>**Euler's Equation Modifications:**<br><br>• What modifications, if any, are required to Euler's equation to accurately account for molecular interactions and the weak discontinuity observed?<br><br>**Time-Dependent Flow Dynamics:**<br><br>• How do time-dependent factors (e.g., valve opening speed, pressure equalization rate) affect the overall flow dynamics between the vessels?<br><br>**Entropy Generation:**<br><br>• What role does entropy generation play in the discharge of gas and how does it manifest | |

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| | differently at hydrodynamic vs molecular scales?<br><br>**Practical Applications:**<br><br>• What potential applications or real-world scenarios can benefit from understanding the combined hydrodynamic and molecular approach to gas flow in this context? | |

**PART 2:**

| | **Reviewer's comment** | **Author's comment***(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
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| **Are there ethical issues in this manuscript?** | *(If yes, Kindly please write down the ethical issues here in details)* | |

**Reviewer Details:**

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|---|---|
| Name: | **Imran Abbas** |
| Department, University & Country | **Air University, Pakistan** |