Gas flow modeling in MEMS based microvalves for next generation CVD reactor designs

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**SCHEMATIC OF A MEMS-BASED MFC**

**MOTIVATION**

- Better in the future for programmability and scaling to the next generation CVD reactors.
- Understandably compatible in process gases and control signals.
- Decrease dead volume, pitch, and face seals.
- Reliability: MEMS diaphragm.

**MODELING THE MICROVALVE**

- MEMS can be used to model microvalves and reactant flow across it for control of a flow regulator or pressure regulator.
- The approach was with MEMS-based microvalves and their advantages.
- The new root is updated till the root of the next iteration is within some defined tolerance.

**CONCLUSIONS AND FUTURE WORK**

- Future work: Compare simulation results with real data from literature if possible. Improve modeling to include other microvalve characteristics in our models, e.g., backflow, laminar/turbulent transition, etc. Also incorporate models of construction in our models and vary our model parameters.

**SIMULATION RESULTS**

**THE EXISTING GAS DISTRIBUTION SYSTEM**

- Fluid flow modeling: Start with assumptions about mean free path length and then add more complexity step by step, i.e., multiple steps in the flow.