



# Week4 - 24th to 30th June

## Student Details

*Name:* Vishwas Vasuki Gautam

*ID No:* 2019A3PS0443H

*PS Instructor:* Dr. Vijay Chatterjee

*Week:* Week4 - 24th to 30th June

## Plan for the Week: (what was your plan for this week in terms of learning and project objectives)

1. Learning about the different viscometers and other components such as micro-chambers, micro-pumps, and microchannels.
2. Expanding my knowledge in simulation and modeling in COMSOL.

## Learning Outcomes of the Week

### About the Project Domain

1. A review of different types of viscometers in diverse applications such as sensing adulteration in various fluids used in day-to-day life, diagnostics in the biomedical domain involving human bodily fluids, pharmaceuticals, and biochemical analysis. Learned about the different flow approaches associated with a microfluidic viscometer, such as pressure flow, capillary flow, electro-osmotic flow, etc. The basic requirements to build a viscometer and the current status, working principle of different Microfluidic viscometers.
2. Explored the domain of micro-pumps. Learned about the various types - mechanical/non-mechanical, valved/valveless, etc.
3. I tried recreating an already implemented micro-pump in COMSOL by making small changes as per our requirement. Learned about the intricacies and complex nature of such an implementation.

## **Skills Gained (Technical as well as soft skills)**

1. Modeling and simulating microfluidic components in COMSOL.
2. More knowledge of micropumps, viscometers.

## **Project Milestones**

1. Completing the mid-term components of PS-1.

## **Major Challenges**

1. The micro-pump I tried implementing was very complex, and this took a lot of effort to recreate it

## **Work Plan for Next Week**

Trying to implement the devices in COMSOL myself. And increase my knowledge base further in viscometers, micropumps, microchambers, and microchannels.



# Week5 - 1st to 7th July

## Student Details

*Name:* Vishwas Vasuki Gautam

*ID No:* 2019A3PS0443H

*PS Instructor:* Dr. Vijay Chatterjee

*Week:* Week5 - 1st to 7th July

## Plan for the Week: (what was your plan for this week in terms of learning and project objectives)

1. Modelling nozzle-based micropump and a microchannel in COMSOL.
2. More detailed information into different types of viscometers in research and development.

## Learning Outcomes of the Week

### About the Project Domain

1. Increased my skills at COMSOL by implementing a Nozzle based micropump and a microchannel that could increase the flow surface velocity by 3 times.
2. I continued my research from week4 in viscometer and learned about the different dimension parameters such as Kund's number, etc.
3. Read the six papers for Quiz-2 and understand the amount of work and effort it takes to get a good publication. Although the technical learning was less due to my lack of my understanding and knowledge, it helped me visualize the extensive research that goes on in such institutions.

## Skills Gained (Technical as well as soft skills)

1. Modeling and simulating microfluidic components in COMSOL.
2. More knowledge of micropumps, viscometers.

## **Project Milestones**

1. I got some substantial results after implementing the nozzle-based micropump and microchannel.
2. Finished the Quiz-2 component of PS-1.

## **Major Challenges**

1. Maintaining confidence and motivation in designing and simulation in COMSOL as it would throw several errors and fixing them was a tedious task.
2. Understanding and comprehending the six papers were a major challenge.

## **Work Plan for Next Week**

Implement other kinds of micropumps to use in viscometers along with microchannels and try to differentiate between them.

Also, fix and improve a few issues with the current viscometer design.



# Week6 - 8th to 15th July

## Student Details

*Name:* Vishwas Vasuki Gautam

*ID No:* 2019A3PS0443H

*PS Instructor:* Dr. Vijay Chatterjee

*Week:* Week6 - 8th to 15th July

## Plan for the Week: (what was your plan for this week in terms of learning and project objectives)

1. Try to model other types of micropumps and see the differences between the nozzle based micropump and see which suits best for the viscometer application.
2. More detailed information into different types of viscometers in research and development.

## Learning Outcomes of the Week

### About the Project Domain

1. Fine-tuned the nozzle based micropump further and learned about the differences with the previous model and versions of the same devices
2. Implemented a flap-based micropump in COMSOL and saw the difference with my nozzle-based implementation.
3. Learned about the different viewpoints of my peers during the group discussion component of PS-1.

## Skills Gained (Technical as well as soft skills)

1. Modeling and simulating different microfluidic components in COMSOL.
2. More knowledge of micropumps, viscometers, etc

3. Speaking skills and gathering good points in a short duration for debates and group discussions.

## **Project Milestones**

1. I got some substantial results after implementing the flap-based micropump and microchannel.
2. Finished the Group Discussions - 2 components of PS-1.

## **Major Challenges**

1. Maintaining confidence and motivation in designing and simulation in COMSOL as it would throw several errors and fixing them was a tedious task.
2. Picking up good points in a short time for group discussions.

## **Work Plan for Next Week**

Work on the reports, seminars and put everything done till now on paper.

Ask my mentor about the future scope of the domain and hopefully continue to associate with this field.