Q&A Group 20.07.2020

In this section, all your questions have been categorized to be answered more efficiently.

Categories

- Compressibility in fluids
- Continuity Equation
- Geometry of channels
- Viscosity in Continuity Equation
- Laminar and turbulent flows
- Others

Compressibility in fluids

- The navier-stokes equation is for incompresisble fluids, is there a related equation for compressible fluids or a correction that can be applied?-*Constanza Álvarez López. You will have to make the process to be volume dependent and strart by modifying the continuity equation, Thermodynamic function ought to be considered*
- Can we say that for incompressible fluids, the continuity equation is indicating that the rate of change of fluid density is negative? (because if fluid is moving out of a differential volume then the amount of fluid within that volume is going to decrease?)-Seyedehniousha Mousavi. *See previous answer*

Continuity Equation

- The continuity equation is not valid where nuclear reations take place, right?-*Javid Azimi Boulali. I am not familiar with the nuclear reactions. If that were the case, then there will be a need to go to the mass transport phenomena that considers the "kinetics".*
- In the video we have covered the continuity equations for rectangular and cylindrical systems and their difference was in the Nabla operator, my question is that in the context of polymers, are there any other continuity equations for other types of systems that can be useful?-Seyedehnioushа Mousavi. The different nabla operators are a result of a transformation from the cartesian to the cylndrical or spherical coordinates, so if you have other geometries you will go for the tranaformation of axes.
- Throughout the application of Navier-Stokes equation is it possible to describe the dynamic behavior of entanglements and what kind of computational analysis are used to solve or simulate this kind of behavior (Stochastic, Monte Carlo)?-*Katya Michelle Aguilar Pérez. There is way to do so and we will need to go to the Thursday class where we are going to see how the PTT model takes care of that.*
- How the flow rate varies by considering the concept of mass flux, for example In injection molding? Because in previous sessions we calculated "Q" but without consider the mass flow rate or vectors -*Katya Michelle Aguilar Pérez The mass flux concept is used in the Naver Stokes and the result will be the one that we already got. But we need to get to mor complex situations to se the advantage of using teh Navier Stokes eqn.*
- If Navier - Stokes Equation serves to understand and describe the behavior of a fluid ... how could we interpret the result of the equation in a real problem? Does the equation only explain newtonian behaviors, right?-*Juan Jesús Rocha Cuervo. It explain the forces, tranform them to stresses and then we need to get a Constitutive eqaution to relate those stresses to the viscosity (either newtonian or non-newtonian).*

Geometry of channels

- Which system shape is more common in most industrial applications?-If we have a more complex system do we get some kind of compound equation? (e.g.) If we have a system with some flat faces and a curved face, how does that affect the equation?-*Angel Manuel Villalba Rodríguez. Curved is prefered over the others also for maintenance and stress issues on the material of construction*

Viscosity in Continuity Equation

- How does viscosity relate to this formula and how could the flow be modeled in a channel separated by a membrane?-*Kendra Corral Nájera* *The continuity equation has no viscosity involved. We wll see taht on tonight´s recording (I will send one tonight after class)*
- How can we include the effect due to viscosity? as it will change how the material enters/leaves/accumulates in the system-*Antonio Osamu Katagiri Tanaka* *See above answer given to Kendra. Wat until tommorrow for the Momentum Equation.*
- Why do we take mass and force into this equation, if we are looking for the flux of the fluid, Viscosity needs to be taken into the equation isn't it?-*Bryan Iván Quintanar Abarca* *There is no force in this equation. Wat until tommorrow for the Momentum Equation.*

Laminar and turbulent flows

- How low must be the Reynolds number of a fluid to be describes by the Navier-Stokes equation?-*Julio Alberto Cao Romero Gallegos All depends on the fluid properties (density and viscosity, please take a look to the definition of Re*
- This equation can be used for both laminar & turbulence flow with respect to their Reynolds number, but we just review it in laminar flow, am I right? *We are going to work only on laminar flows*
- In Laminar flow, when we have a viscoelastic polymer, we can use this model, what is its application with comparison to the previous model for viscoelastic behavior of the polymer? *Elnaz Hosseinzadeh. This equation is only for mass balance. Wat until tommorrow for the Momentum Equation.*

Others

- We saw in the video the continuity equation in different coordinates systems, in the industry are there systems that requiere such coordinates systems?-*Jesús Alberto Martínez Espinosa Not only that, they can be in a dimensionless form for better results when uisng it, specially for design purposes*
- Is it possible to use this equation to calculate and predict the way of a fluids? Forexample, in simulations like you can see in this video: https://www.youtube.com/watch?v=8hpqwfZah08. *The equation gets more complicated for turbulent flows and you need to get into more complicated simulations.*
- also, how it would be useful in big simulations like that are done in big computers. Imean that the video shows some examples of graphic simulations focused perhaps on video games or movies, but my question is it this formulas and models can be applied for research simulations and what kind of information we would get?-*Jonathan Rafael Núñez Gálvez Yes , the equations can be used for simulatons, and based on the video they also interact with fractals.*
- Can be used this formulas or models in microfluids? And have the same properties? *Jonathan Rafael Núñez Gálvez Yes, they can be used. In the momentum balance it can be used but you need to consider other forces such as capillary forces (we will see that in another video like the one i sent last night).*