סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 16.01.2020 (י"ט בטבת, תש"פ), בניין דן קאהן, אודיטוריום 1, 13:45.

מרצה: אמיר לוייבסקי

מנחה: פרופ"מ רנה ואן האוט

מנחה שותף: פרופ' ג'וזואה שנייטמן, הנדסה ביורפואה

על הנושא:

Time resolved, tomographic measurements of oscillatory respiratory flows in an upper airway model

The seminar will be given in Hebrew

תקציר ההרצאה :

All aerobic creatures, including humans, need oxygen in order to exist. The respiratory system is responsible for the gas exchange between oxygen and carbon dioxide in the lungs. The severity of common pulmonary diseases such as asthma and acute respiratory distress syndrome (ARDS), as well as the large complexity of the lungs' structure, make respiratory fluid dynamics the second most explored type of biological flows. Both experiments as well as numerical simulations have been performed. However, most experiments have focused solely on steady inhalation without analyzing the exhalation part of the breathing cycle. In addition, very little is known about the actual breathing cycle that is oscillatory.

In this work, time-resolved, tomographic PIV (tomo-PIV) measurements of the oscillatory respiratory flow (Re = 150, and 450) in an Elastosil model were performed. The model included a double bifurcation, mimicking human airways. Common-practiced frequencies in high frequency ventilation (HFV) protocols were applied, resulting in Womersley numbers ranging between 3.2 < Wo < 7.2. Increasing Re at fixed Wo showed the appearance of significant Reynolds stresses. Furthermore, we observe asymmetry despite an overall symmetric bifurcation tree. Combined Dean effects and Womersley effects are illustrated through the mean velocity profiles and helicity iso-surfaces. Our experiments add to the general understanding of oscillatory flow phenomena in bifurcating networks.

בברכה,

פרופ"א אתי סאס

מרכז הסמינרים