סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ד׳
01.09.2021 (כ״ד באלול, תשפ״א), בשעה 13:30, אוד׳ 1, קומת כניסה, בנין דן קהאן ובאמצעות
הזום: https://technion.zoom.us/j/95242059008

מרצה: יקיר וענונו

מנחה: פרופ׳ אמריטוס שמעון הבר

על הנושא:

Deposition of particles smaller than 2.5 micron in the human lung acinus

The seminar will be given in Hebrew

תקציר ההרצאה:

This research examines the deposition patterns of particles smaller than 2.5 micron in the human lung acinus, which is the deepest region in the lung that includes pulmonary alveoli. These particles move down the airway tree under the influence of diffusion (Brownian motion), air convection and gravitation.

For the purpose of demonstrating the general behavior of particle motion and deposition in a micronic pipe, particle deposition simulations were performed using MATLAB program. The results are presented.

In addition, CFD analysis results are presented for pipes of different acinar generations. These analyses were performed by final volume method, using ANSYS Fluent program, including a two-phase flow investigation by discrete phase model (DPM) method. The analyses were performed in two main parts: The first part investigated the influence of particle size and gravity direction on the generational deposition fractions, for particles of same density. The second part investigated the influence of particle density on the deposition fractions. Calculation reliability was tested by ensuring quality element mesh and low residuals, meeting convergence criteria and monitoring the mass balance.

1-micron particles of low density ($500\ kg/m^3$) were found to deposit (62.33%) on the alveolar walls, more than all the particles tested.

The results of the research reflect the tendency of particles with different properties, to deposit in a preferred acinar generation. Thus, a generational mapping is obtained, and can be used to predict the deposition percentage of aerosols at different acinar depths. Particle deposition predictions in the lungs can be used both for medical purposes (inhaled drug design) and for reducing toxicological damage.

בברכה,

פרופ״ח אתי סאס
מרכז הסמינרים