
Departmental Seminar

Seminar Title	: Pressurized metered dose inhaler-based analysis of respiratory drug delivery using the coupled discrete phase and Eulerian wall film model
Speaker	: Sameer Kumar Verma (Roll No: 522me1012)
Supervisor	: Prof. Saurav Datta, PIC (Departmental Seminar)
Venue	: Seminar Hall (Room Number: ME -001)
Date and Time	: 09 Sep 2024 (05:00 PM)
Abstract	: The study employs the Discrete Phase Model (DPM) and the Eulerian Wall Film (EWF) to provide a more accurate prediction of drug deposition in the respiratory airways. The methodology suggests that microscopic liquid medication particles are breathed, which, when they strike the lung airways, form a thin coating of the therapeutic component. The EWF model simulates the deposition and spread of the drug layer using the Eulerian approach to combat respiratory viruses. This allows for a more precise prediction of the post-impact dynamics of drug layer spread, an area where previous studies were limited. Parametric studies were conducted with three particle sizes 1 μm , 5 μm , and 10 μm at flow rates of 15, 30, and 60 liters per minute (LPM). Results show that in the fourth airway generation (G4), film thickness (FT) increased by 68.75% compared to G1 for 10 μm particles at a flow rate of 15 LPM. Furthermore, at the G4 level, 10 μm particles showed much better deposition efficiency than 1 μm particles (10.4 times) and 5 μm particles (6.54 times). Therefore, for effective patient treatment, particle sizes between 5 and 10 μm are recommended, as smaller particles (< 5 μm) may pose health risks by reaching deeper into the lungs, while larger particles (> 10 μm) tend to deposit in the oral cavity.