Department of Mathematics, BGU

Colloquium

On *Apr ,5 2022*

At *14:30 – 15:30*

In *Math 101-*

Shlomo Hareli (BGU)

will talk about

About the Dynamics of Polydispersed Fuel

Abstract: A poly disperse fuel spray consist of thousands of droplets in various volumes and shapes. The Combustion of the poly disperse is a chemical process which releases useful thermal energy. The poly disperse fuel droplets are described by a discrete function - the particle (droplet) size distribution (PSD).

Models of the combustion process which accounts for each droplet are impracticable as they require a considerable amount of computations. As a result, approximations are used to describe the combustion process. The approximations fail to describe the particle PSD adequately.

We propose a simpli

ed theoretical model which allow us to use continuous distribution functions to approximate any PSD (experimental or theoretical) during the combustion process much more accurately then previous ap- proximations. The time depended distribution functions allow us to in- vestigate the dynamics of the poly

disperse fuel elegantly and even permit an analytical study. The model provided some new theoretical insights.

Our main results show that during the sefl-ignition process, the radii of the droplets decreased as expected, and the number of smaller droplets increased in inverse proportion to the radius. An important novel result (visualized by graphs) demonstrates that the mean radius of the droplets initially increases for a relatively short period of time, which is followed by the expected decrease.