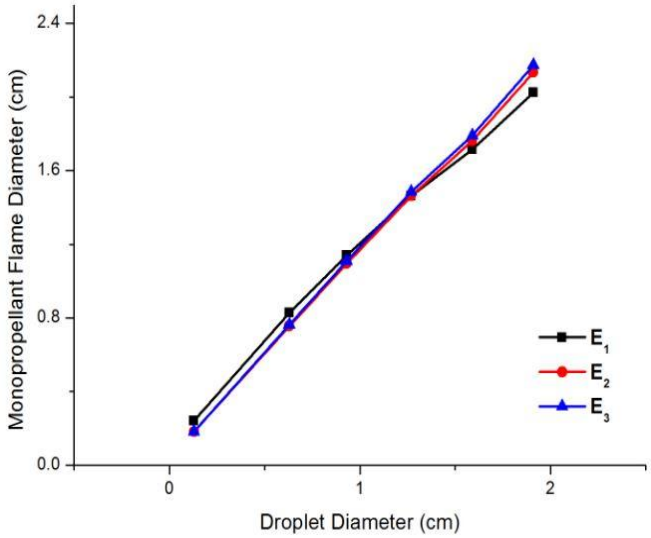

Figure 4: Variation of monopropellant flame diameter with varying drop diameter

Mass burning rates for the hybrid combustion case vary more acutely with the droplet diameter, thus demonstrating the effect of the monopropellant flame. The non-linear variation of the mass burning rates for hybrid combustion may be explained by considering the energy balance at the droplet surface, the monopropellant flame and the bipropellant flame. It is evident from the increasing that the effect of the monopropellant flame increases with droplet diameters

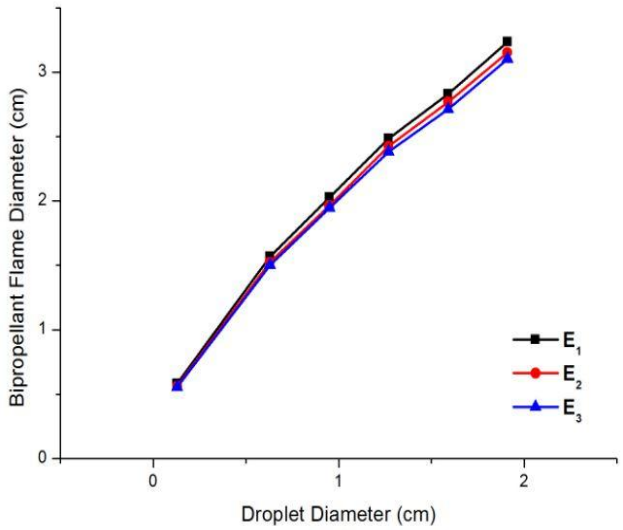

Figure 5: Variation of Bipropellant flame diameter with varying drop diameter

Since the mass burning rates are dependent on the energy conducted from the monopropellant flame to the droplet surface, hence the monopropellant flame temperatures should increase rapidly to supply the additional energy required. Since the energy conducted from the monopropellant flame is balanced by the sum of the energy conducted from the bipropellant flame and the constant heat of decomposition of hydrazine, the energy conducted from the bipropellant flame has to increase as well.

6. Conclusion

Simulation was done for two different cases. One for varying droplet diameter whiles other at different oxygen mass fraction. In both case monopropellant and bipropellant flame diameter found to be increase with varying droplet diameter while in case of varying oxygen, droplet was kept constant, and hence both monopropellant and bipropellant diameter were found to be constant. Increasing the droplet diameter and ambient oxygen mass fraction was found to increase the mass burning rate.

In case of varying droplet diameter simulation result varies from experimental result as 9%, 12% and 13% for all three pair of activation energy respectively while in case of varying oxygen, percentage variation was 7%, 8% and 10%.

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Author Profile

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