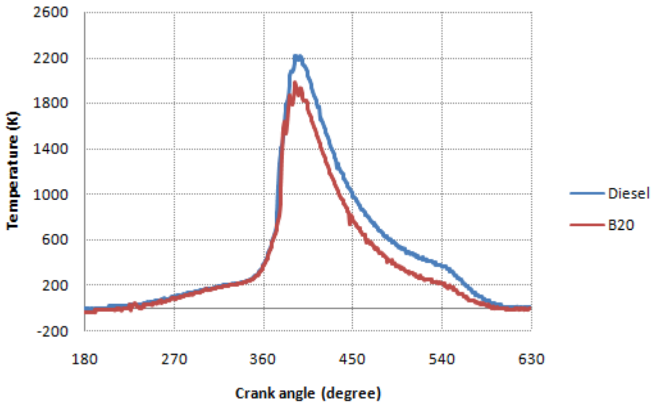
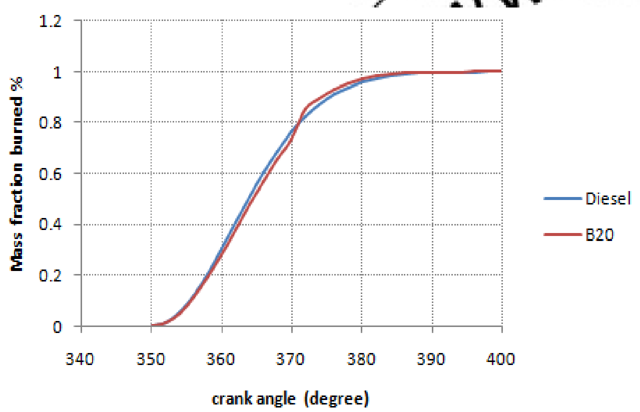


Figure 6: Temperature vs. crank angle

5.5 Mass fraction burned

Figure 7 shows variation of mass fraction burned with crank angle. Mass fraction burned is modelled with Wiebe correlation.



It has been seen that biodiesel takes more time as compared to pure diesel in mixing/atomization due to lower volatility and higher viscosity. So that the burning rate of biodiesel is slower and takes more time. Therefore large amount of fuel needs to be injected taking longer injection time resulting inferior atomization. For high viscous blend, fuel should be injected at high injection pressure for proper air fuel mixing.

6. Conclusion

In the present study experimental calculation and simulation of rate of heat release and pressure have been carried out on the compression ignition (CI) engine fuelled with diesel and biodiesel (20% by mass). The single zone zero dimensional model for closed cycle combustion process has been successfully developed. This model predicted the combustion characteristics in closer approximation to that of experimental results; hence the developed mathematical model is suitable for prediction of combustion characteristics of CI engine. Combustion Characteristics showed smaller ignition delay and slower combustion result in longer combustion duration for biodiesel blends. Biodiesel blend B10 and B20 showed approximately the same results like diesel fuel so that it can be used as alternative fuel for CI engine. B30 and B40 showed low peak pressure and heat release rate as compared to diesel and other blends because of lower volatility, lower heating value and higher viscosity. In summary, karanja oil's higher concentration blends are not suitable as alternate fuels in unmodified engine.

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