CH EN 533: PROJECT PROPOSAL

Identification of paper and a description of the importance of the paper is entitled **Diffusion flames (1928, Authors: S.P. Burke and T.E.W. Schuman).**

According to George Granger Brown,1928," Combustion is without exaggeration the most important reaction to humanity. All human and animal existence depends upon combustion as its source of energy". In general, flames may be divided into two classes: flames of the Bunsen type in which the combustible gas and air are premixed before ignition occurs and flames in which the combustible gas and air meet coincidently with the occurrence of combustion. In combustion, a diffusion flame is a flame in which the oxidizer and fuel are separated before burning. The name diffusion flame was first suggested by S.P. Burke and T.E.W. Schumann in 1928 to differentiate from premixed flame where fuel and an oxidizer are premixed prior to burning. The diffusion flame is also referred to as non-premixed flame. This paper employs the study of the flame front, the rate of diffusion of the combustible gas outward and the rate of diffusion of oxygen inward. This paper is important because it uses transport phenomena to solve the equations of diffusion for the gas and for the oxygen based on certain boundary and initial conditions. I am interested in this paper not simply because I am interested in combustion but also how combustion reactions have improved people's lives in the past century, so the quest for cleaner and efficient combustion reactions will always be dear to me.

Relevancy to Transport Phenomena.

Since combustion is confined to a surface called the flame front where the oxygen and combustible gas meet to combine and form the neutral products of complete combustion. Determining the physical characteristics of these flames adopts the use of transport phenomena starting with fundamental assumptions, simplifying the diffusion equation, applying boundary and initial conditions, applying some mathematical treatment in order to come up with a solution equation and then plotting graphs of height and shape of the diffusion flame for a flat flame.

Project Scope

The scope of my project is to reproduce the general solution of the diffusion flame (flame front) for a flat flame case and using steps learnt in transport phenomena starting with a conservation equation for a binary mixture based on the coordinate system, in this case it is a mass transfer problem with a rectangular coordinate system. I intend to apply the same assumptions the authors applied in the paper in order to solve the simplified conservation equation and reproduce the same general solutions they produced for the rectangular coordinate system.

Gannt Chat

Task	*What to do?*	*Due*
Project Proposal	Work on it for about 2hrs daily	11/23/2021
Fundamental Equation	Begin deriving the fundamental equations	12/03/2021
Fundamental Equation	Finalize deriving the fundamental equations	12/08/2021
Plots	Generate plots based on the fundamental equations	12/08/2021
Paper	Start writing a paper	12/09/2021
Paper	Finish writing a paper	12/14/2021
Slides	Generate slides and prepare for the oral presentation	12/16/2021