DISCUSSION:

I. Jet Flame Physical Description

> As the fuel flows along the flame axis, it diffuses radially outward, while the oxidizer diffuses radially inward.

> The flame surface can be defined as:

 $Flame Surface \equiv \frac{Locus \text{ of points where}}{\Phi \text{ equals unity}}$

> The products formed at the flame surface diffuse radially both inward and outward

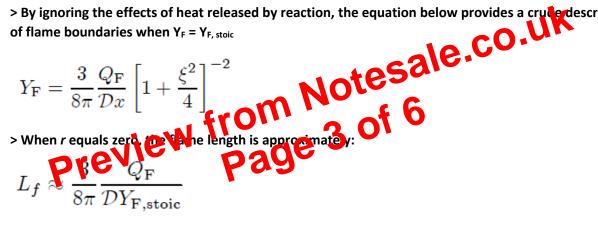
> An overventilated flame is where there is more than enough oxidizer in the immediate surroundings to continuously burn the fuel

> Underventilated flame is the opposite of an overventilated flame

> Flame length for an overventilated flame is determined at the axial location where:

 $\Phi(r=0, x=L_f)=1$

> By ignoring the effects of heat released by reaction, the equation below provides a cruited description



> Flame length is proportional to volumetric flow rate of fuel

> Flame length is inversely proportional to the stoichiometric fuel mass fraction

> Since $Q_F = v_e \pi R^2$, various combinations of v_e and R can yield the same flame length

> Since the diffusion coefficient D is inversely proportional to pressure, the height of the flame is independent of pressure at a given mass flow rate.

HISTORICAL THEORETICAL FORMULATIONS:

i. Burke and Schumann (1928)

- Constant velocity field parallel to flame axis
- Reasonable predictions of L_f for round burners

ii. Roper (1977)

- Relaxed single constant velocity assumption
- Provides extremely good predictions