Internal Combustion Engines , ME422 Yeditepe Üniversitesi

Homework #3   to be submitted by 8th December, 2017

Swirl ratio is a dimensionless parameter used to quantify rotational motion within the cylinder and can be defined by two different methods as [1],

$$SR_1 = \text{(angular speed) / (engine speed)} = \omega \, / \, N \qquad (1)$$

and

$$SR_2 = \text{(swirl tangential speed) / (average piston speed)} = u_t \, / \, c_m \qquad (2)$$

For a single cylinder, one-litre engine running at 4200 [rpm] the swirl ratio obtained by the first method (SR_1), is given as "6" .

Engine bore to stroke ratio is , $B \, / \, S = 1.1$

Calculate,

    i)   tangential component of the gas velocity in the cylinder for the given conditions above,

    ii) swirl ratio as defined by the second method (in equation 2).

Discuss your results and indicate the **advantages** and **disadvantages** of **swirl** in the cylinder. Also discuss the effects of **tumble** and **squish** in the cylinder.

[1]   Pulkrabek, W.W., Engineering Fundamentals of the Internal Combustion Engine, Prentice Hall, New Jersey, USA, 1997.