Unit 10 - Week 9: Practical aspects of atomizer fabrication and manufacturing

Assignment 9

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. 

Due on 2019-04-03, 23:59 IST.

The student is asked to design an atomizer to produce uniform spray for a gas turbine engine, based on the above figure and the following data:

\[ m = 0.64 \text{ kg/s} \] is the mass flow rate of kerosene,
\[ \Delta P = 3.45 \text{ MPa} \] is the pressure drop across nozzle,
\[ \sigma = 0.048 \text{ N/m} \] is the surface tension of kerosene,
\[ \mu = 0.00192 \text{ Ns/m}^2 \] is the dynamic viscosity of kerosene,
\[ \rho = 830 \text{ kg/m}^3 \] is the density of kerosene,
\[ c_d = 0.2 \] is the discharge coefficient,
\[ K = 0.09 \] is the geometric constant of the atomizer,
\[ \beta = 90^\circ \] is the inlet port angle and
\[ 2\theta = 80^\circ \] is the spray cone angle

1) Find the discharge orifice diameter, \( d_0 \) in mm

Hint
2) Find the length of the discharge orifice, $l$ in mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 0.9

1 point

3) Find the width of tangential inlet orifice, $d_p$ in mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 0.4

1 point

4) Find the diameter of the swirl chamber, $D_s$ in mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 3.15, 3.2

1 point

5) Minimum length of the swirl chamber, $l_s$ in mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.6, 0.65

1 point

6) Find the location of inlet slot from atomizer centre, $R$ in mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 0.6

1 point

7) Find the thickness of the liquid sheet, $t$ in mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 0.2
8) Find the Sauter mean diameter of the spray (based on Wang and Lefebvre correlation), $D_{32}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.65, 0.68