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17/ENG06/072

MECHANICAL ENGINEERING

FLUID MECHANICS

1. Given µ= 0.9, , , ,
   1. From continuity equation

q = A.u

where

Because Re < 2000, the flow is laminar

1. Given , G = 0.85, ,

, D = 65mm = 0.065m , L = 95m

Rate of flow, Q = A.u

Where

* 1. Centre line velocity =

But,

* 1. Total frictional drag, fD

Where

* 1. Power required to maintain flow

* 1. Velocity gradient at the pipe wall
  2. Velocity and shear stress 60mm from wall

The shear stress can be found as;