Answer on Question #75518-Physics-Other

The viscous of a fluid is given by F=6π×constant of the coefficient of viscousity^x×velocity^y×radian^z. By dimensional analysis obtain the values of x ou and z

Solution

$$F = 6\pi\eta^x v^y r^z$$

$$[F] = [\eta]^x[v]^y[r]^z$$

$$[L^1M^1T^{-2}] = [L^{-1}M^1T^{-1}]^x[L^1M^0T^{-1}]^y[L^1M^0T^0]^z$$

$$[L^1M^1T^{-2}] = [L^{-x}M^xT^{-x}][L^yM^0T^{-y}][L^zM^0T^0]$$

$$[L^1M^1T^{-2}] = [L^{-x+y+z}M^xT^{-x-y}]$$

We have:

$$x = 1$$

$$-x + y + z = 1$$

$$-x - y = -2$$

$$y = 2 - x = 2 - 1 = 1$$

$$z = 1 - y + x = 1 - 1 + 1 = 1$$

Thus,

$$x = y = z = 1.$$

So,

$$F = 6\pi\eta vr$$

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