

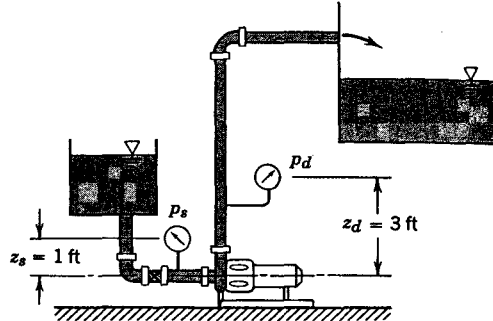
ME 322 Lecture 10
15 Feb 2007

from Introduction to Fluid Mechanics
R.W. Fox and A.T. McDonald
4th ed., 1992 Wiley

EXAMPLE 11.3—Calculation of Pump Characteristics from Test Data

The flow system used to test a centrifugal pump at a nominal speed of 1750 rpm is shown. The liquid is water at 80 F, and the suction and discharge pipe diameters are 6 in. Data measured during the test are given in the table. The motor is supplied at 460 V, 3-phase, has a power factor of 0.875, and a constant efficiency of 90 percent.

Rate of Flow (gpm)	Suction Pressure (psig)	Discharge Pressure (psig)	Motor Current (amp)	Pump Speed (rpm)
0	-3.7	53.3	18.0	1750
500	-4.2	48.3	26.2	1745
800	-4.7	42.3	31.0	1749
1000	-5.7	34.3	36.0	1750
1100	-6.2	31.3	37.0	1747
1200	-6.7	27.3	37.3	1752
1400	-7.7	15.3	39.0	1750
1500	-8.4	7.3	41.5	1753



Calculate the net head delivered and the pump efficiency at a volume flow rate of 1000 gpm. Plot the pump head, power, and efficiency as functions of volume flow rate.

Electrical Power: $P_{in} = \eta_m \sqrt{3} F V_m I_m$

η_m = motor efficiency
 F = power factor (dimensionless)
 V_m = voltage applied to the motor
 I_m = motor current