Florida International University
Department of Civil and Environmental Engineering

CWR 3201 Fluid Mechanics
Fall 2018

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Homework Assignment 7

*Mechanics of Fluids (**Fifth edition**), by M.C. Potter, D.C. Wiggert and B.H. Ramadan.*

1. 12.6 (same number in *Fourth edition*)
For the system shown in Fig. P12.6, water flows through the pump at a rate of 50 L/s. The allowable *NPSH* provided by the manufacturer at that flow is 3 m. Determine the maximum height Δz above the water surface at which the pump can be located to operate without cavitating. Include all losses in the suction pipe.

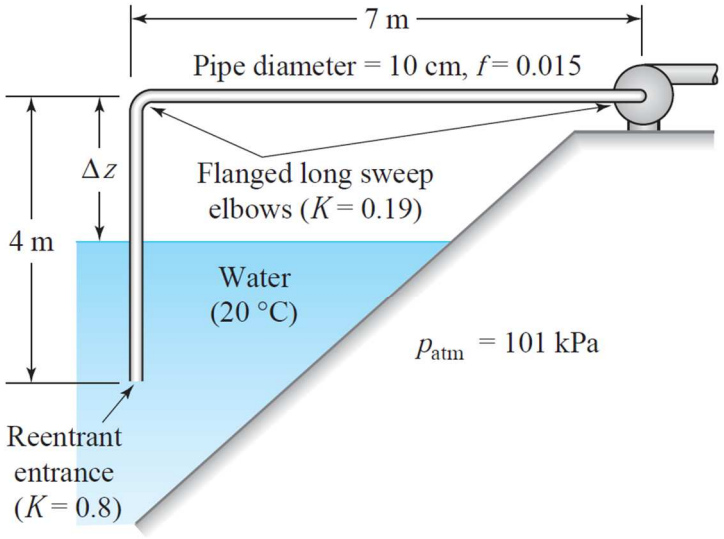

Fig. P12.6

2. 12.28 (same number in *Fourth edition*)
The 240-mm-diameter pump represented in Fig. 12.6 is used to move water in a piping system whose demand curve is $62 + 270Q^2$, where Q is in cubic meters per second. Find the discharge, required input power, and the *NPSH* requirement for:
(a) One pump **(b)** Two pumps in parallel

3. 12.30 (same number in *Fourth edition*)

Crude oil ($S = 0.86$) is to be pumped through 3 miles of 18-in.-diameter cast iron pipe. The elevation rise from the upstream to the downstream end is 640 ft. If an available pump is the 240-mm-diameter radial-flow machine of Fig. 12.6, how many pumps in series are required to provide the most efficient operation? Find the required power.

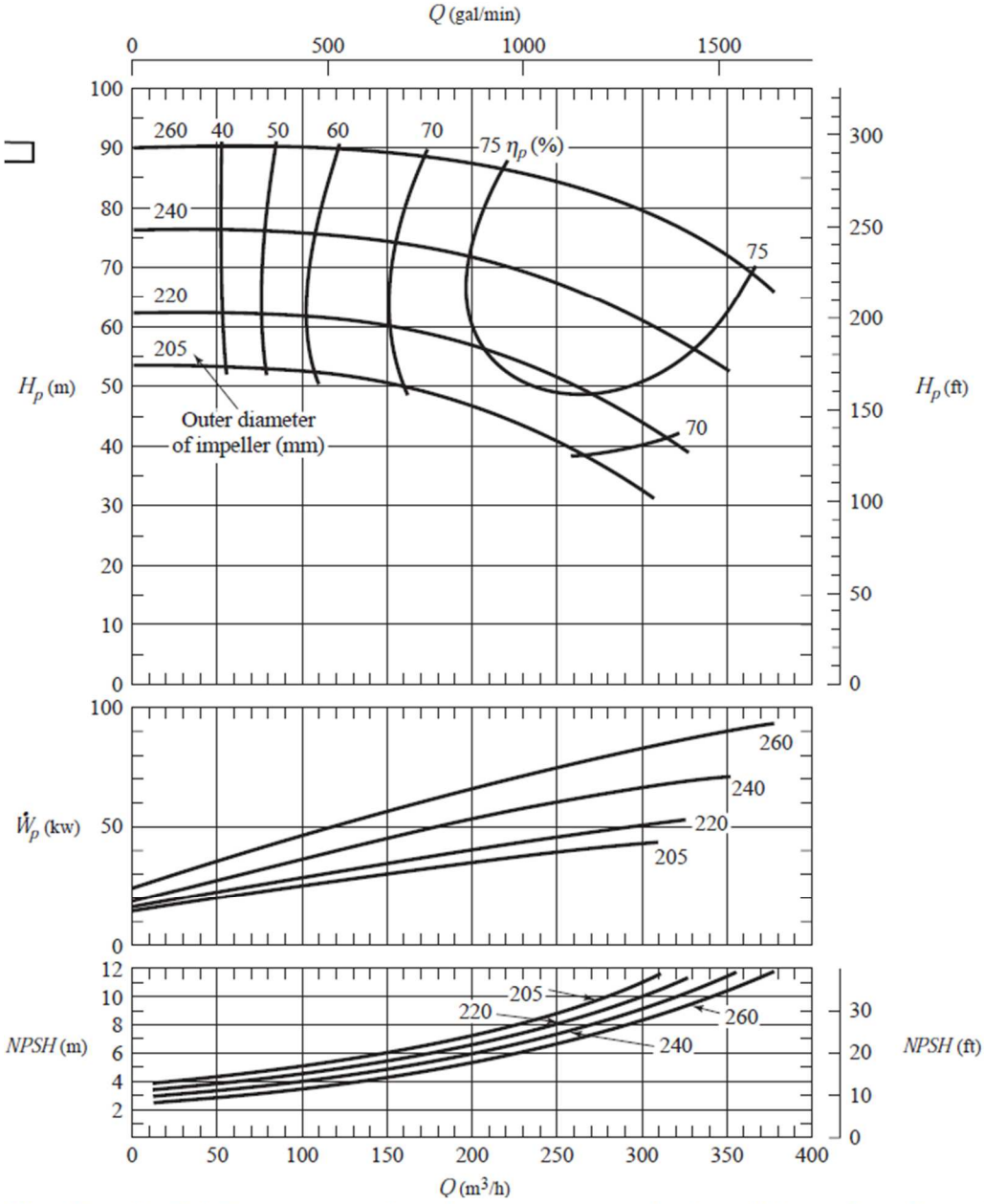

Fig. 12.6 Radial-flow pump and performance curves for four different impellers with $N = 2900$ rpm ($\omega = 304$ rad/s). Water at 20°C is the pumped liquid. (Courtesy of Sulzer Pumps Ltd.)