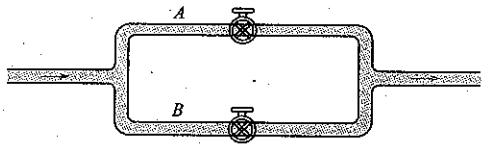
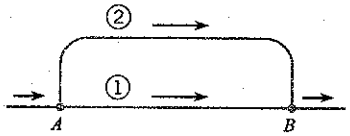


PROBLEMS 10.103, 10.104

10.104 A flow is divided into two branches as shown. A gate valve, half open, is installed in line A, and a globe valve fully open is installed in line B. The head loss due to friction in each branch is negligible compared to the head loss across the valves. Find the ratio of the velocity in line A to that in line B (include elbow losses for threaded pipe fittings).

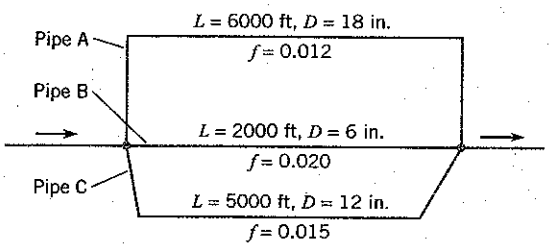
10.105 In the parallel system shown, pipe 1 has a length of 1000 m and is 50 cm in diameter. Pipe 2 is 1500 m long and 40 cm in diameter. The pipe is commercial steel. What is the division of the flow of water at 10°C if the total discharge is to be 1.0 m^3/s?



PROBLEMS 10.105, 10.106

10.106 Pipes 1 and 2 (see Fig. for Probs. 10.105 and 10.106) are both the same kind (cast-iron pipe), but pipe 2 is four times as long as pipe 1. Both are the same diameter (1 ft). If the discharge of water in pipe 2 is 1 cfs, then what will be the discharge in pipe 1? Assume the same value of f in both pipes.

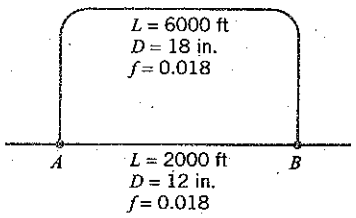
10.107 Water flows from left to right in this parallel pipe system. The pipe having the greatest velocity is a) pipe A, b) pipe B, c) pipe C.



PROBLEM 10.107

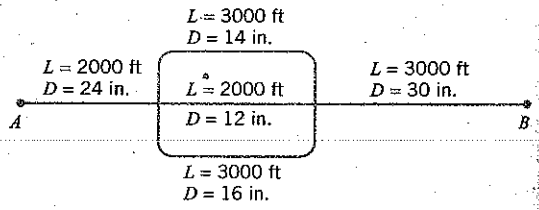
10.108 Two pipes are connected in parallel. One pipe is twice the diameter of the other and three times as long. Assume that f in the larger pipe is 0.010 and f in the smaller one is 0.013. Determine the ratio of the discharges in the two pipes.

10.109 With a total flow of 14 cfs, determine the division of flow and the head loss from A to B.



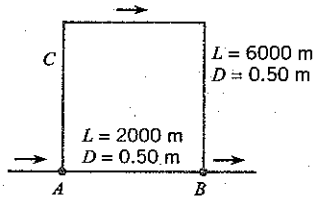
PROBLEM 10.109

10.110 The pipes shown in the system are all concrete. With a flow of 20 cfs of water, find the head loss and the division of flow in the pipes from A to B. Assume $f = 0.030$ for all pipes.



PROBLEM 10.110

10.111 A parallel pipe system is set up as shown. Flow occurs from A to B. To augment the flow, a pump having the characteristics shown in Fig. 10.17 is installed at point C. For a total discharge of 0.60 m^3/s, what will be the division of flow between the pipes and what will be the head loss between A and B? Assume commercial steel pipe.

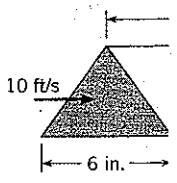


PROBLEM 10.111

10.112 Frequently
pass line will be in
some of the fluid
valve then controls
that the head-vers
given by $h_p = 100$
in m^3/s. The bypa
the only head loss
head-loss coefficie
system is 0.2 m^3/s.
and bypass line.

10.113 Consider
in cross section) ar
wide and with a de
radius for the air fl
for the water flow
which one of the fo
lic radius is true:
$0.67R_W$, d) $R_A = 0$.

10.114 Air at 60°
horizontal duct wi
equilateral triangle
long, and the dime
structed of galvan
velocity in the duc
over the 100-ft len



10.115 Consider
channels. They bo

1. Determine the head loss, given the kind and size of pipe and the flow rate.
2. Determine the flow rate, given the head, kind, and size of pipe.
3. Determine the size of pipe needed to carry the flow, given the kind of pipe, head, and flow rate.

In the first type of problem, the Reynolds number and k_s/D are first computed and then f is read from Fig. 10.8, after which the head loss is obtained by the use of Eq. (10.22).

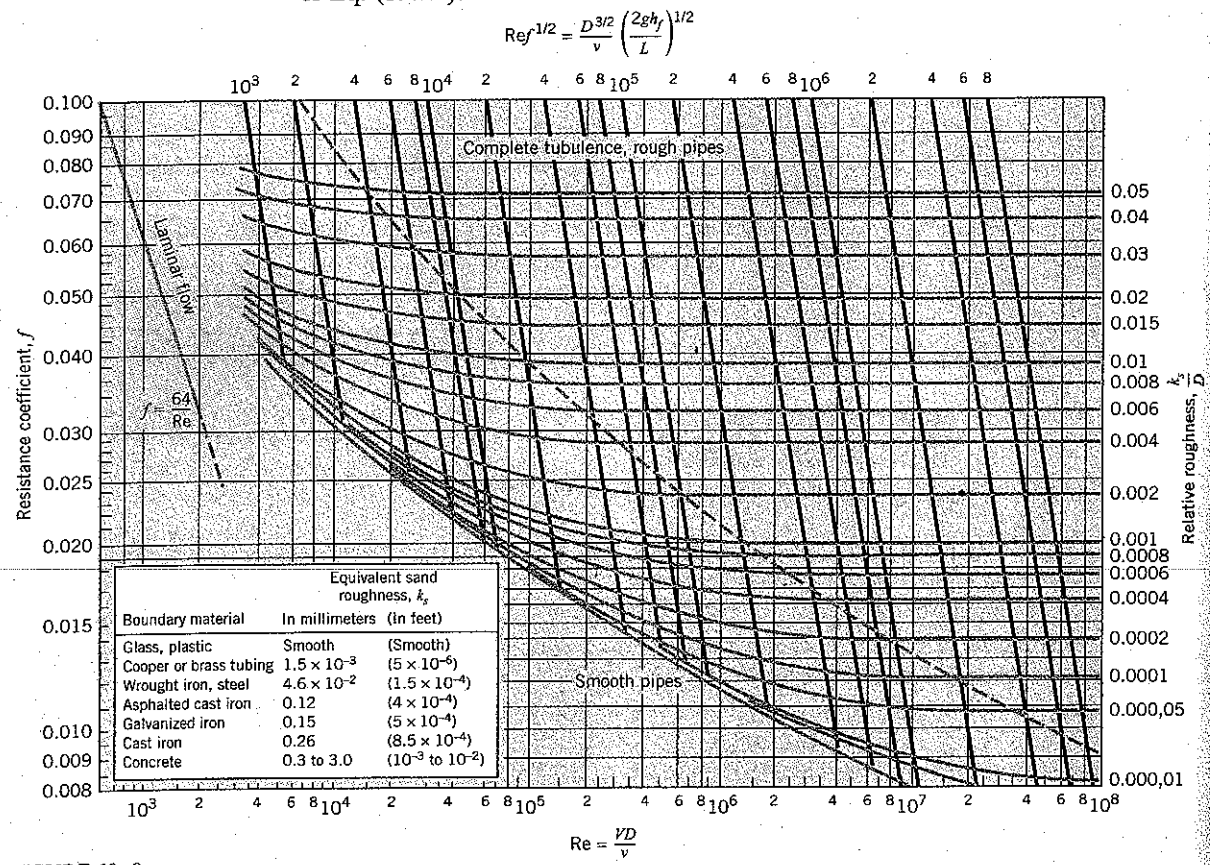


FIGURE 10.8
Resistance coefficient f *versus Re. Reprinted with minor variations. [After Moody (29). Reprinted with permission from the A.S.M.E.]*

FIGURE 10.9
Relative roughness for various kinds of pipe. [After Moody (29). Reprinted with permission from the A.S.M.E.]