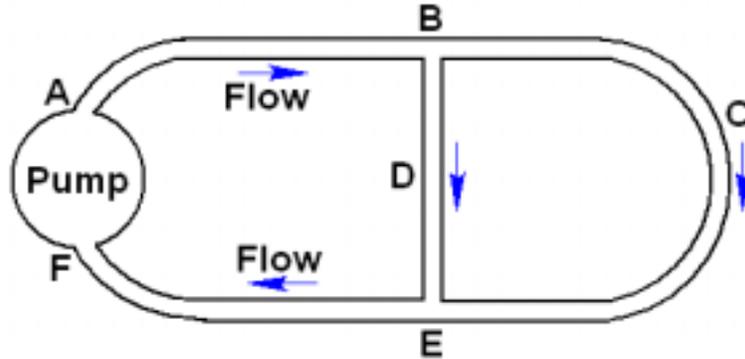## Problem 205E

A pump supplies cooling water to two parallel pipelines as shown in the sketch below.

The pump characteristic is such that the total pressure rise, ΔP, across the pump is related to the volume flow rate through the pump, Q, by:

$$\frac{\Delta P}{\rho} = B - CQ^2 \tag{1}$$

where ρ is the fluid density and B and C are known constants. The pipes all have the same internal cross-sectional area, A, and the various sections indicated in the sketch have loss coefficients as follows. The lengths AB, EF and BDE all have the same loss coefficient denoted by k. On the other hand the length BCE has a loss coefficient equal to $4k$. Find an expression for the velocity of flow in the section BCE.