Problem Set 7   Spring 2006   Due April 25

The city of Bangkok has many canals, called klongs, which are used for water transportation. Unfortunately, many of the klongs receive sufficient quantities of raw sewage that they are devoid of oxygen. One plan to help improve water quality is to flush the klongs using relatively clean water from the adjacent Chao Phraya River. Assume the following simplified situation as sketched below
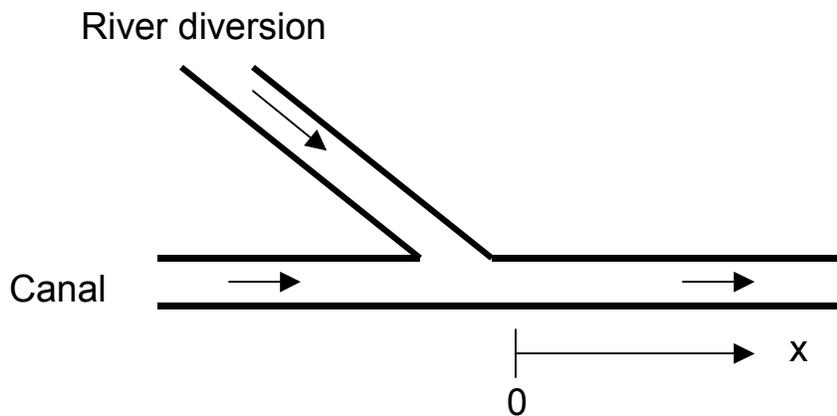
Upstream in canal:

   Flow: $Q_1 = 2$ m^3/s,
   Width $B_1 = 10$ m,
   Depth $H_1 = 2$ m,
   Temperature $T_1 = 20$ ^{o}C,
   DO concentration $C_1 = 0$ mg/L,
   BOD concentration $L_1 = 5$ mg/L

Diverted river flow:

   Flow $Q_2 = 2$ m^3/s,
   Temperature $T_2 = 16$ ^{o}C,
   DO concentration $C_2 = 8$ mg/L,
   BOD concentration $L_2 = 3$ mg/L

Compute and plot the longitudinal distribution of dissolved oxygen concentration downstream from the merger assuming no additional sources of inflow or BOD, and no changes in canal cross section. Use a BOD decay rate of 0.33 d^{-1}.