1. Please Explain the Following Item: (10%).

   (1). Normal Depth   (2). Gradually Varied Flow

   (3). Critical Flow   (4). Kinetic energy correction factor

   (5). Continuity Equation

2. A spherical dust particle at an altitude of 80 km. Its size and specific gravity are 25 μm and 2.5, respectively. Assume the viscosity μ of air, in poises, to be express by $\mu = A - By$, where $A = 10^{-4}$ and $B = 10^{-9}$, and y in meters measured from sea level. Estimate the time for these particles to reach sea level. Neglect air currents and wind effects. (10%)

3. Please draw the figures of control volume for a fluid flow and derive the Bernoulli Equation from the Euler's Equation along a streamline. (20%)

4. Please draw a figure and derive the equation of Losses Due to Sudden Expansion in a pipe flow. (20%)

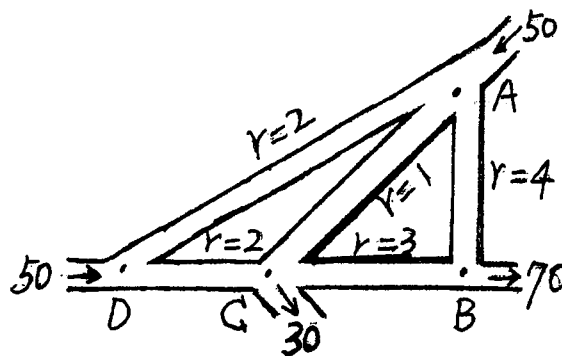5. Please determine the flow through each line of Fig.5, n=2. (20%)

Fig. 5

6. Please draw a figure and derive the following equation:

   (1). Chézy Formula (10%)

   (2). Manning Formula. (10%)