ANALYTICAL SOLUTION TO THE ADVECTION-DIFFUSION EQUATION WITH CONSTANT COEFFICIENT

Syahidah Binti Ishak & Dr. Zaiton Binti Mat Isa

Advection-diffusion equation and its related analytical solutions have gained wide application through different areas. The analytical solutions benefit from some advantages if compared to numerical solutions. As such, many analytical solutions have been presented for the advection-diffusion equation. The difference between the solutions obtained is mainly because of the types of boundary conditions. This research presents an analytical solution for the advection-diffusion equation with constant coefficient without source term. A classical mathematical substitution transform the original advection-diffusion into an exclusively diffusion equation. The new diffusive problem is then transformed by using Laplace method. New space and time variables are introduced to get the solutions. The general solution of this diffusion equation is then being solved based on three cases of boundary condition involving one of Dirichlet and two of Newmann condition. This thesis provides the detail steps in solving advection-diffusion equation analytically. The solutions in all possible combinations of increasing or decreasing temporal dependence are compared with each other with the help of graphs.

GENERATING AN INITIAL SOLUTION FOR CAPACITATED VEHICLE ROUTING PROBLEM BY USING SEQUENTIAL INSERTION ALGORITHM

Tan Chai Fei and FarhanaJohar

This research discussed about the extension of the Vehicle Routing Problem (VRP) called the Capacitated Vehicle Routing Problem (CVRP). CVRP deals with the distribution of goods between depots and customers restricted to a single capacity constraint. The main objective of this research is to construct, allocate and arrange customers among routes designed involving a fleet of homogeneous vehicles. Heuristic method, that is, the Sequential Insertion algorithm will be adapted in generating an initial solution to the problem. Our case study is to solve the CVRP involving 100 customers with limitation that every customers is visited by exactly once with only one vehicle where the total demand on each route must be within the vehicle's capacitylimit. Thus, coding of the Sequential Insertion algorithm based on the developed pseudocodes is completed by using the C++ Language Programming in order to generate the initial solution of the CVRP.