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**Keywords:** Shallow Water Equations, Lattice Boltzmann Method, Two Dimensional Flows.

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## MGI 71 - A NEW TYPE OF FUZZY CONTROL POINT IN SPACE CURVE

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### ABSTRACT

The control point is the most important element in the production of Spline curve or surface model. This is because any changes of control points in the spline model effect the shape of the resulting curve or surface. Wahab and colleagues have introduced fuzzy control points to solve the problem of uncertainty prevailing in the spline modeling. However, based on this concept, this paper will discusses a new type of fuzzy control point that can generates a spline space curve model in 3-dimensional. This is because the generated control point is a 3-dimensional that meets the basic concepts of fuzzy set was introduced by Zadeh. However, this paper only taking a Bezier model as a numerical example in the discussed model.

**Keywords:** space curve; fuzzy set; spline; control point.

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## MGI 72 - COORDINATION OF PRODUCTION SCHEDULING AND VEHICLE ROUTING PROBLEM WITH RELEASE AND DUE DATE

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**ABSTRACT**

This work is concerned with solving the vehicle routing problem (VRP) which takes into account the customer's release and due date. The problem studied can also be categorized as a non-classical VRP as the departure times of vehicles depend on the dates of orders released from the production line and become available for the distribution process.

The problem is investigated through two stages. In the first stage, vehicle routing problem with release and due date (VRPRDD) is treated. At the beginning of the planning, it is assumed that the dates where the customer orders become available are known. A mathematical formulation is developed to represent the problem which solved by several heuristics, i.e. Variable Neighborhood Search (VNS), Large Neighborhood Search (LNS) and Tabu Search (TS). The algorithms are written in C++ and run on a PC computer with an Intel PentiumCore by using 56's Solomon instances with some modification. Different kinds of vehicle routing problem have been tackled in order to see the performance of proposed heuristics. The results are then compared in order to find the best method which yields the least routing cost solution. From the outcome obtained, VNS is proved to be the best algorithm which generates the least cost solution to our problem.

Further investigation has been carried out in stage two which considers the extension of VRPRDD. The coordination of production sequence and vehicle routing (PS-VRPRDD) is the main subject to our problem studied in which the best production sequence will leads to the least routing. Classical decomposition approach, namely Alternateis used which decompose the problems into two sub-problems, i.e. production sequence and vehicle routing. The results proved that effective coordination shows the large potential savings that attract the interest of industrial distributors in optimizing their distribution process in practice

**Keywords:** VRP with release and due dates, coordination of production scheduling and vehicle routing.

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**MGI 73 - A MODEL OF UNSTEADY BLOOD FLOW IN COMPLEX  
MICROCIRCULATORY NETWORKS**

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