

DEPENDENCE OF CONCENTRATION OF IONS ON QUALITY

OF THE WATER USED

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helium-neon laser / Norshazlinda Rosli.

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DEPENDENCE OF CONCENTRATION ON FLOW VELOCITY
USING HELIUM-NEON LASER

By
Norshazlinda Binti Rosli

A thesis submitted in partial fulfilment of the
requirements for the award of the degree of
Bachelor of Applied Science (Physics Electronics and Instrumentation)

DEPARTMENT OF PHYSICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
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2008



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DECLARATION

I hereby declare that this thesis entitled 'Dependence of Concentration on Flow Velocity using Helium-Neon Laser' is the result of my own research except as cited in the references.

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ABSTRACT

The main purpose of this study is to investigate flow velocity of organic dye with different concentration. Organic dye that is applied in this study called Alphazurine A or known as Triphenylmethane dye. In this study, Laser Doppler Anemometry technique is developed as a laser based measurement technique which is due to the Doppler effect of light and the frequency shifting of the laser light. From the frequency shifting of the particle movement, the evaluation on flow velocity of the Alphazurine A is obtained because Doppler Effect of light is proportional to the flow velocity. In this study, five different concentration of organic dye known as Alphazurine A is prepared by using a process of dilution. The concentration of these dye were carried from 20% to 100%. Thus, a 'Measure' software is used in this study to capture, evaluate and analyze a graph obtain during this Laser Doppler Anemometry measurement. Hence, from analyzing the graph and evaluating flow velocity, higher concentration which is 1.0 Molar gives a higher velocity of flow particle with the rate of 1.3217 millisecond and the lower concentration contribute to the lower speed of velocity gives the value of 1.0230 millisecond. Application areas related to this study are wind tunnel velocity experiments for testing aerodynamics and velocity measurement in water flows.

ABSTRAK

Tujuan utama kajian ini dilaksanakan adalah untuk mengkaji halaju aliran bagi pewarna organik dengan menggunakan kepekatan yang berbeza. Pewarna organik yang digunakan dalam kajian ini dinamakan Alphazurine A. Dalam kajian ini, satu teknik yang dikenali sebagai 'Laser Doppler Anemometry' diwujudkan dimana teknik ini adalah berkaitan dengan kesan Doppler bagi cahaya dan perpindahan frekuensi cahaya laser. Daripada perpindahan frekuensi bagi pergerakan zarah aliran ini, halaju aliran bagi Alphazurine A dengan kepekatan berbeza dapat dinilai. Ini adalah kerana kesan Doppler bagi cahaya adalah berkadar dengan halaju aliran. Dalam kajian ini, lima kepekatan berbeza bagi Alphazurine A disediakan dengan menggunakan proses pencairan. Kepekatan bagi organik ini disediakan daripada 20% sehingga kepekatan 100%. Dengan itu, perisian yang dikenali sebagai 'Measure' digunakan untuk menganalisa, mengumpul dan menilai graf yang dihasilkan. Oleh itu, daripada penganalisaan graf dan penilaian halaju aliran, didapati bahawa kepekatan tertinggi iaitu 1.0 Molar memberikan kadar halaju yang maksima dengan kadar 1.3217 meter sesaat berbanding kepekatan yang paling rendah iaitu 0.2 Molar dengan kadar halaju yang minima dengan nilai 1.0230 meter sesaat. Lazimnya, kajian ini diaplikasikan dalam ujikaji halaju terowong angin bagi ujian daya gerakan udara serta diaplikasikan juga dalam pengukuran halaju dalam pengaliran air.