

# DESIGN OF FLUID MECHANICS BASED ON MULTIMEDIA TECHNOLOGY

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**ABSTRACT:** Cultivating individuals by virtue is the cornerstone of a university, and including ideological and political thought within the curriculum is a tactical way to accomplish this vital objective. Using multimedia to its fullest potential and incorporating it into ideological and political material under the guise of adhering to college-specific teaching guidelines is an excellent technique to assist students in developing a right attitude on life, world view, and values. The implementation of specific measures, strive to teach professional theory knowledge, at the same time to undertake to the student the spirit of the ideal faith level instructions

**KEYWORDS:** Fluid Mechanics, Curriculum Ideology and Politics, Design; practice, Multimedia Technology

## I. INTRODUCTION

This CD-ROM is a superb rendition of some of the most important concepts in fluid mechanics, including an excellent library of flow visualization pictures (mostly short movie clips and computer animations). The CD is designed to complement, either at the undergraduate or intermediate graduate levels, traditional instructor-based courses in fluid mechanics. It can also be used as a stand-alone source by a mature student, researcher, or practicing engineer to facilitate the review some of the key ideas in the subject[1]. The CD is very moderately priced (under \$20). This reviewer estimates the ratio (educational value to cost) to be (almost) infinite and has purchased three CDs for departmental use and plan to purchase another five for student use. As the reader may guess, this reviewer highly recommends the CD to both instructors as well as students. The CD enables the subject of fluid mechanics,

impart lasting visual impressions and images, most of them in color.

This reviewer will introduce his own terminology to describe the contents of the CD. At the outset, one should know that there is no audio. This reviewer did not find this to be a problem, but perhaps in a new release audio can be included (this is probably not as simple as it sounds). Audio would help to draw the viewers' attention to certain aspects of the visualizations [2]. It is worth reemphasizing that the CD is meant to be a companion to a course on fluid mechanics (so the audio could come from a qualified instructor). The CD contains a number of simulators that open up in separate java application windows. These are: 1) boundary layer solver (ie, the user provides the external steady flow for which the boundary layer development is calculated numerically), 2) a potential flow simulator that can be used to calculate the flow pattern for arbitrary combination of elementary building blocks (eg, point sources, vortices, uniform stream, etc), and 3) a molecular dynamics simulator to track the motion and interaction of many (on the order of 100) particles to develop a feel for the continuum hypothesis. This reviewer should also mention the historical material on the "greats" of fluid mechanics (15 in number; from Couette to von Karman) and the extensive video library containing 256 animations.

There is a lot of material on this CD. Even an experienced researcher can spend hours(!) browsing around and viewing classic animations, either experimental or

numerical. This reviewer thoroughly enjoyed this activity [3]. Many of the video clips are also available from other sources. However, this CD is a compact (no pun intended) source of reference. The verbal descriptions are longer and much more informative than typical captions in a photo album of flow visualizations. This reviewer is no computer expert, yet had no problem navigating through the various topics. However, this reviewer was unable to print any information from the CD or minimize the window when the CD was running. These may be minor shortcomings. The verbal commentary is generally clear and good. There are some instances where greater precision should be exercised. For example, it is stated that the flow outside a boundary layer is irrotational [4]. An experienced reader will immediately recognize the implicit meaning (ie, irrotational upstream flow). A student, however, may be confused. Here is where the instructor must step in. Another instance is in the potential (irrotational) flow simulator in which there is an option to view the motion of a small line of fluid particles of fixed identity. The line rotates. Again, an experienced reader will immediately understand this. A student, on the other hand, may be puzzled. Audio would also help to explain things.

A country without virtue would not prosper; a man without virtue would not stand. At the National Conference on Ideological and Political Work in Colleges and Universities, Xi Jinping stressed that "ideological and political work should run through the whole process of education and teaching". The teaching and ideological and political contents of specialized courses are organically integrated into the classroom, which exerts an imperceptible influence on students' ideology and behaviour [5]. Taking "cultivating people by virtue" as the fundamental task of education, the ultimate

goal of curriculum education will be realized. "Moral education" is the first step, teachers should pay attention to the organic unity of teaching, teaching, solving doubts, and educating people and talents. The idea of ideological and political courses is collaborative education, and its purpose is to achieve the same direction of professional courses and ideological and political theory courses, and realize the pluralistic unity of knowledge impart, value shaping and ability cultivation [6]. To carry out the ideological and political construction of professional courses, the first step is to dig deeply and refine the ideological and political elements contained in professional courses, guide students on the basis of impart professional knowledge, and give the important task of leading the value of professional courses.

## II. LITERATURE SURVEY

N. Hageman *et al.*, [7] introduce a fluid mechanics based tractography method that estimates the most likely connection path between points in a tensor distribution function (TDF) dataset. We simulated the flow of an artificial fluid whose properties are related to the underlying TDF dataset. The resulting fluid velocity was used as a metric of connection strength. We validated our algorithm using a digital phantom dataset based on a pattern with two intersecting tracts. When compared to a TDF streamline method and our single tensor fluid mechanics tractography algorithm, our method was able to segment intersecting tracts at a finer spatial resolution. Our method was successfully applied to human control data to segment a major fiber pathway, the corpus callosum, even in problematic regions with crossing fiber geometries.

B. Lorendeau, Y. Fournier and A. Ribes, *et.al* [8] Numerical simulations using supercomputers are producing an

increasingly larger volume of data to be visualized. In this context, Catalyst is a prototype In-Situ visualization library developed by Kitware to help reduce the data post-treatment overhead. On the other side, Code Saturne is a Computational Fluid Dynamics code used at Eléctricité de France (EDF), one of the biggest electricity producers in Europe, for its large scale numerical simulations. In this article we present a study case where Catalyst is integrated into Code Saturne. We evaluate the feasibility and performance of this integration by running two test cases in one of our corporate supercomputers.

Juntaek Ryoo, Z. Dragojlovic and D. A. Kaminski, et.al [9] Adaptive-Network-Based Fuzzy Inference System (ANFIS) was used to control convergence of a Computational Fluid Dynamics (CFD) algorithm. Normalized residuals were used to select the relaxation factors on each iteration of the computation. The ratio between the residual of the current iteration and of the previous iteration was used as a control input. ANFIS was designed to keep the tuning index at or near one throughout the fluid dynamics simulation. The finite volume CFD algorithm SIMPLER was used as the platform for this study. Four different benchmark cases were examined.

Kongde He, Yourong Li, Zifan Fang and Weihua Yang, et.al [10] buoy of underwater mooring was selected as study object, we put forward the virtual mass concept based on analysis of fluid-solid coupling eigenvalue for buoy, the underwater virtual mass matrix for buoy was deduced by the finite computing method of structure vibration modal on flow field and the basic equation of hydrodynamics; the natural properties analysis was carried out considered the action of water by Msc Nastran software and compared the result in air and underwater, the result can be got that the

eigenvalue was decreased for the action of water; and a new method was provided for the similar structures design.

S. S. Hegde, A. Deb and S. Nagesh, et.al [11] Computational bio-mechanics is developing rapidly as a non-invasive tool to assist the medical fraternity to help both diagnosis and prognosis of human body related issues such as injuries, cardiovascular dysfunction, atherosclerotic plaque etc. Any system that would help either assist diagnosis prognosis would be a boon to the doctors and medical society in general. Some work also has been done in the area related to the use of computational fluid mechanics to understand the flow of blood through the human body, an area of hemodynamics. Since cardio-vascular diseases are one of the main causes of loss of life, understanding of the blood flow with and without constraints (such as blockages), providing alternate methods of prognosis and further solutions to take care of issues related to blood flow would help save valuable life of such patients. This work attempts to use Computational Fluid Dynamics (CFD) to solve specific problems related to hemodynamics. In particular mathematical modeling of the blood flow in arteries in the presence of successive blockages has been analyzed using CFD. Also considered is the effect of increase in Reynolds number on wall shear stress values. Also, the concept of fluid structure interaction has been used during analysis.

Y. Liu *et al.*, [12] relationship between regional alterations in wall motion, normalized wall shear amplitude (NWSA), and atheromatic lesion composition was evaluated in the Yucatan miniswine model with developing atherosclerosis. We induced vascular lesions by endothelial cell denudation. The animals were fed a

high cholesterol diet for 8 weeks to develop early atherosclerotic lesions. At the end of the 8 weeks, hemodynamic and intravascular ultrasound (IVUS) image data were obtained in both the denuded and control femoral arteries. The vascular segment geometry was reconstructed from the imaging data and the CFD analysis performed in each segment incorporating the vascular wall motion data obtained from the images as a moving boundary condition. NWSA was correlated with vessel wall motion and lesion composition. Data from 6 control and 4 diseased arteries were analyzed. Results demonstrate that wall motion and NWSA increased in an arterial segment with atheroma compared to those in healthy regions, as determined from histology. However, the wall motion in the diseased segments demonstrated regional variability compared to relatively uniform distribution in the healthy segments. This study demonstrates the regional variability in the wall motion and NWSA in vascular segments in the presence of early atheroma compared to those in healthy segments.

M. E. -A. SLIMANI, R. SELLAMI, A. Mahrane and M. AMIRAT, et.al [13] proposes a study of different configurations of a bi-fluid thermal solar collector, where the two fluids (air and water) circulate in forced convection. The bi-fluid solar collectors are suitable for medium-temperature applications (as in the residential sector) and can be integrated into roofing homes. These solar collectors consist of a ribbed metal absorber and an air duct. Inside the ribs confined by a transparent cover, are arranged tubes of water. In this study, several configurations and geometric designs have been proposed and studied theoretically and experimentally in order to choose the most efficient of them from energy and technico-economic point of

view. The theoretical analysis of this bi-fluid solar collector was performed based on a balance of heat transfers of the various elements constituting the solar device and taking into account the dynamic operating mode of the collector. Experimental work was also carried out in order of design and realization of a prototype of this type of solar collector in collaboration with the Solar Facilities Development Unit (UDES) in Tipaza (Algeria). Several on-site experimental tests have been made for different configurations of the bi-fluid solar collector. The configuration of the bi-fluid dual airflow solar collector showed the best energy performance in terms of thermal power and thermal efficiency (with an overall efficiency of 70%).

J. Juzna, P. Cesarek, D. Petcu and V. Stankovski, et.al [14] application for analysis of structures under static loading is ported to the cloud using the mOSAIC portable platforms-as-a-service. The new cloud application benefits from Web availability, elasticity, and fault tolerance, while being independent from the infrastructures-as-a-service provider.

A. Bogdanov, A. Degtyarev and V. Khramushin., et.al [15] architecture of a digital computing system determines the technical foundation of a unified mathematical language for exact arithmetic-logical description of phenomena and laws of continuum mechanics for applications in fluid mechanics and theoretical physics. Deep parallelization of the computing processes serves to the revival of application of functional programming at a new technological level. The efficiency of computations is provided by true reproduction of the fundamental laws of physics and continuum mechanics. Tensor formalization of numerical objects and

computing operations serves to spatial interpolation of rheological state parameters and laws of the fluid mechanics as mathematical models in the local coordinates of the elementary numeric cells - large liquid particles. The proposed approach allows the use of explicit numerical scheme, which is an important condition for increasing the efficiency of the algorithms developed by numerical procedures with natural parallelism.

### III. METHODOLOGY

Ideological and political education content is seamlessly connected in the professional knowledge system, and historical figures suitable for students' curiosity and interest points are designed, or cases such as social and engineering are implanted. Combined with the status and role of scientific and technological progress in national prosperity and national rejuvenation, the university students' ideals and beliefs are guided by the "Chinese dream" of the great rejuvenation of the Chinese nation. From the impact of science and technology on the country and society, nature and human beings, the paper extracts the patriotic feelings of responsibility and responsibility, legal consciousness, social responsibility. engineering ethics, cultural confidence, humanistic spirit and other elements.

Cultivate students' national pride, through pictures, micro lessons, short videos, animations or film and television clips, this article introduces the three times that Da Yu, a man who controlled the floods in BC, passed through his house without entering. Li bing and his son built two generations of Dujiangyan to benefit the people, Zheng he's seven western 20 at home and abroad, the father of a nuclear submarine xu-hua Huang, founder of modern mechanics Zhou Peiyuan, the father of China's space, the father of the

missile Qian Xuesen in turbulent flow theory, aerodynamics, and other fields has made outstanding contributions, He became a world-renowned aerodynamicist at the age of 28. Through the story of these deeds, students can be stimulated with strong national pride, guide and educate students to set up the determination to serve the motherland, imperceptibly imprint the feelings of the motherland in the hearts of students.

Pay attention to social hot spots and guide students positively On the afternoon of May 5, 2020, the Humen Bridge in Guangdong Province experienced abnormal tremors. Many people said that the whole bridge was "up and down" shaking like a wave, which triggered heated discussion. Therefore, when teaching aerodynamics and vortex-vibration knowledge will take this problem as a case to inspire students to analyze problems from an objective, factual perspective and an all-round perspective. For example, whether novel coronavirus can be transmitted through "aerosol" is of great concern. In the face of hot spots, I introduced the knowledge of "aerosol" at the same time, pointed out that the isolation of the virus can not isolate love, in the face of the disaster, the Chinese nation sincere unity, people from all walks of life with their own practical actions to practice the patriotic, professional, friendly socialist core values.

Make it clear that practice is the sole criterion for testing truth Fluid Mechanics corresponds to a lot of in-class experiments. Through teachers' guidance and students' experiments, students can not only improve their practical ability, but also clarify the process of scientific inquiry. By drawing conclusions through theory and verifying conclusions through experiments, students can personally

experience the materialist epistemology that "practice is the only standard for testing truth".

Cultivate students' perseverance Through the fluid is in the process of continuous flow deformation information guides the student to understand the characteristics of a fluid's continued "does not fear the difficulty, the spirit of" with, fluid power "weak", but "surrender" strength and perseverance of the spirit of "little strokes fell great oaks", more like we are the good qualities of the Chinese nation, is also a kind of life wisdom. For example, when teaching floating bodies, he introduces the story of Archimedes' identification of the golden crown. If there is no long-term accumulation of experience, it is difficult to find something only by chance. This conclusion is drawn from the ideal model through rigorous mathematical derivation, which just reflects the characteristics of Archimedes' scholarship.

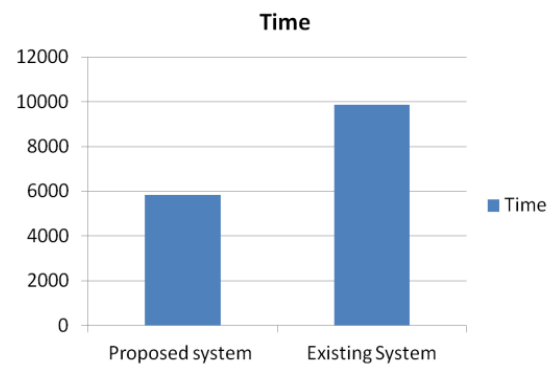
Cultivate students' professional awareness The integration of core value guidance and professional knowledge impart enables students to develop engineering thinking, enlightening "fluid intelligence" engineering wisdom, arousing students' reverence for social responsibility and scientific spirit and responsibility for social mission. Through pipeline hydraulic calculation of engineering cases, to help students understand follow the importance of professional norms, the convection strength of three principle analysis, the scientists implanted the rigorous, dialectical, dedication, guides the student to set up the "dedication, lean, focused, innovati spirit of great powers, to cultivate students with innova entrepreneurial spirit and good sense of engineering.

#### IV. RESULT ANALYSIS

In this section performance analysis of fluid mechanism using multimedia technology is observed in this section.

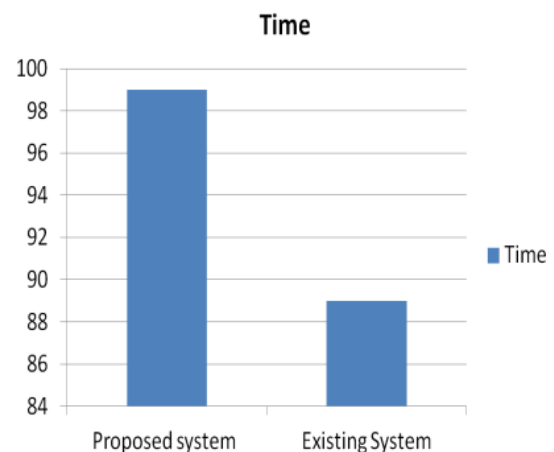
**Table.1: Performance Analysis**

Parameters	Proposed system	Existing System
Time saving	8546	9876
Accuracy	99	89



**Fig.1: Time Comparison Graph**

In Fig.1 time comparison graph is observed between proposed system and existing system.



**Fig.2: Accuracy Comparison Graph**

In Fig.2 accuracy comparison graph is observed between proposed system and existing system.

## V. CONCLUSION

Fluid Mechanics offers a rich ideological and political teaching interface in its course material. It is also possible to incorporate the right worldview, viewpoint on life, and value education into the classroom by using multimedia technologies and a sensible teaching design. The results of the teaching practice demonstrate that students' interest in the fluid mechanics course has improved, and their academic performance has significantly improved after deliberately implementing course thinking and politics. Students' professional knowledge is not diminished by ideological or political education; in fact, the course evaluation results show that students understand the course's fundamental concepts. Hence, this model achieves better results in terms of time saving and accuracy.

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