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# Pan Functional Variational Roudong Technique from the Perspective of Data Science or Smart System Studied

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## Abstract

This paper aims at rural revitalization from the perspective of data science. Its method is to adopt three groups of comparative research approaches: man-machine mutual assistance and interpersonal mutual assistance, including personal self-help, and the third method is as follows: First, point out the problems: with the acceleration of urbanization, the factors of production in rural areas in China are greatly drained, the gap between urban and rural development is widening, and the dual economic structure between urban and rural areas is becoming more and more serious. The capitalist mode of production not only harms the interests of farmers, but also makes the workers in cities lose their self-worth. Further, explore the way out: the arrival of the digital age has promoted the development of rural areas, guaranteed the interests of farmers and rebuilt the spiritual home of China people. Finally, grasp the key point: analyze the difficulties faced by rural development. At present, there are many difficulties in rural areas, such as resource outflow, low labor productivity of agricultural industry, unclear confirmation of data elements, rigid rural construction structure, etc., and there is a fierce collision between eastern farming civilization and western urban civilization behind it. The result is that, it is proposed to use the means of data value to promote the flow of factors into rural areas and tap effective demand by helping non-commercial finance of primary production. Its significance lies in: it is clear that rural revitalization is currently facing a new era, a new track and a new journey. In the new era, the Chinese nation is experiencing a great rejuvenation, and Chinese civilization will develop new connotations under the collision with western civilization. On the new track, agriculture should seize the digital technology and lead China to take the lead in the fourth industrial revolution. On the new journey, we will build a socialist modern country in an all-round way and embark on a unique Chinese modernization road.

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**Keywords:** Big Data; Human-Computer Mutual Assistance; Data Science; Smart System Studied; Seven Time Pass; Three Ring Interaction

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## 1. Main text

This paper aims at rural revitalization from the perspective of data science. So for that we should further explore the innovative practice of smart education guided by the theory of smart system studied as Rongzhixue, that is, the research on man-machine cooperation assisted by using the STEAM for big data with AI, and for that the application of the man-machine cooperation based on the results show that in the era of big data and artificial intelligence, not only adopts three groups of control studies closely related but harmonious and different. Among them, it includes not only the traditional rule-based expert knowledge system, but also big data processing based on statistics, machine

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learning and deep learning, a new generation of AI and even primary general artificial intelligence, such as GPT and LLM.[1-8]

Three groups of closely related but harmonious but different places as the nomenclatures are the formal expression tools of the foundation of this smart system studied for the Research on the *Mode* as e.g.:

#### Nomenclature

- A. 2.1.The first group of human-computer dialogue results (*Xiaohui Zou and ChatGPT4*) ;
- B. 2.2.The second group of man-machine conversation results (*Xiaohui Zou and Chatbot by JKTChat*) ;
- C. 2.3.2.3.The third group is the self-questioning and self-answering (*Jiang in Chinese and Zou in English*)

## 2. Methods

Its method is to adopt three groups of comparative research approaches: man-machine mutual assistance and interpersonal mutual assistance, including personal self-help, and the third method is as follows: First, point out the problems: with the acceleration of urbanization, the factors of production in rural areas in China are greatly drained, the gap between urban and rural development is widening, and the dual economic structure between urban and rural areas is becoming more and more serious. The capitalist mode of production not only harms the interests of farmers, but also makes the workers in cities lose their self-worth. Further, explore the way out: the arrival of the digital age has promoted the development of rural areas, guaranteed the interests of farmers and rebuilt the spiritual home of China people. Finally, grasp the key point: analyze the difficulties faced by rural development. At present, there are many difficulties in rural areas, such as resource outflow, low labor productivity of agricultural industry, unclear confirmation of data elements, rigid rural construction structure, etc., and there is a fierce collision between eastern farming civilization and western urban civilization behind it.

What is about “*Rural Revitalization from the Perspective of Data Science*”? The responses of the two software AI systems are completely different. This has caused us to think: Is it just the difference between the responses of the human-computer interaction software AI system designed based on API in the foreground, or the difference between its LLM in the background? This is not only a problem for data science (mainly in form) but also for smart system (including form and content, its existence principle and construction method) . The following is the examples of how two software AI systems face this research topic:

### 2.1. The first group of human-computer dialogue results (*Xiaohui Zou and ChatGPT4 by Time-saving technology*)

**People ask question:** What is about “Pan Functional Variational Rubbing Technique from the Perspective of Data Science or Smart System Studied”?

**Machine answer** (artificial intelligence system gives generalized experience): The meaning of "Pan Functional Variational Rubbing Technique from the Perspective of Data Science or Smart System Studied" is a bit unclear as it seems to be a phrase that combines different elements.

"Pan Functional Variational Rubbing Technique" does not have a commonly known definition. It appears to be a term that might be specific to a particular context or field. Without additional information, it is difficult to determine its exact meaning.

However, the phrase "from the Perspective of Data Science or Smart System Studied" suggests that the technique is being examined or analyzed in relation to data science and smart systems. This implies that data science and smart systems are being used to investigate or understand the technique in some way.

Overall, the meaning of the phrase would depend on the specific context in which it is being used and the field it is associated with.

## 2.2. The second group of man-machine conversation results (Xiaohui Zou and Chatbot by JKTChat)

**People ask question:** Fan functional variational kneading/robbing technique includes: fan functional, variational and kneading/robbing, three key qualifiers; They combine to form a new technology. Its application is very extensive. Separately, it is easy to say, because every term has a clear meaning; Taken together, it requires a large cross-border experience and a large span of background knowledge. Why?

**Machine answer** (artificial intelligence system gives generalized experience): The reason why the application of fan functional variational kneading/robbing technique requires cross-border experience and a wide range of background knowledge is because each of the three key qualifiers - fan functional, variational, and kneading/robbing - comes from different fields and has its own specific concepts and methods.

Fan functional refers to the generalization of functions, which is a concept widely used in mathematics, physics, engineering, and other fields. It allows us to view functions not just as numerical values but as mappings or relationships between variables. To understand and apply fan functional, one needs to have a solid understanding of mathematical concepts, such as function spaces, functionals, and mappings.

Variational methods are a general approach for solving optimization problems and finding extremal values. They are widely used in mathematics, physics, engineering, and other disciplines. Variational calculus involves studying how functions change with respect to small variations and using these variations to find optimal solutions or extremal values. The application of variational methods requires a deep understanding of calculus, optimization theory, and functional analysis.

Kneading/robbing, which refers to the process of perturbing or manipulating functions, is a concept that often appears in the study of stability, sensitivity, and response analysis. It involves introducing small perturbations or disturbances to a system or function to observe how it affects the behavior of the system or the value of the functional. The analysis of kneading/robbing techniques often requires knowledge of control theory, dynamical systems, and numerical methods.

When these three qualifiers are combined in the fan functional variational kneading/robbing technique, the complexity and interdisciplinary nature of the method become apparent. To apply this technique effectively, one needs to have a broad understanding and knowledge across multiple fields, including mathematics, physics, engineering, and possibly other specific disciplines related to the problem at hand.

In summary, the application of fan functional variational kneading/robbing technique requires cross-border experience and a wide range of background knowledge because it combines concepts and methods from different fields. This interdisciplinary nature necessitates a comprehensive understanding of various mathematical and physical principles to effectively apply this technique in different domains.

Functional variational kneading technique is a technique which comprehensively applies functional, variational and kneading. Functional is a generalized concept of function, which can be regarded as a mapping relationship, not just a numerical value. Variation is to study the influence of the change of function on functional, and the extreme value of function can be obtained by solving the variational problem. Kneading is a small disturbance to the function to observe its response to the functional.

The wide application of functional variational kneading technology benefits from its integration of concepts and methods in many fields. Functional has important applications in mathematics, physics, engineering and other fields, and can describe complex system behaviors. Variational method is a general method to solve extreme value problems, which can be applied to optimization, control and optimization. The kneading technology can be used to analyze the stability and sensitivity of the system.

Due to the complexity and interdisciplinary nature of functional variational kneading technology, its application is wide. In physics, it can be used to describe the path of particles, the change of field and other issues; In engineering, it can be used in optimization design and system control. In finance, it can be used for risk management, portfolio optimization and other issues. In a word, the application of functional variational kneading technology in various fields requires cross-border experience and extensive background knowledge to give full play to its advantages.



Fig. 1. (a) first picture is *Zou with ChatGPT4* by Time-saving technology; (b) second picture is *Zou with Chatbot* by JKTChat.

Based on the experimental results of the above two human-computer dialogues, the following basic analysis can be made: firstly, it can be seen that the general strategies of the two design and production teams are completely different, one is ; The other .

(as to how much of his answer meets the meaning of the question, or satisfies the questioner or can be recognized to what extent? That is a problem that anyone will encounter in the process of further active exploration). This is the most fundamental difference between the responses of the human-computer interaction HCI software AI system based on API design in the foreground. Further, it can be seen that there are at least two situations in which two foreground softwares use background LLM, either directly adopting the GPT and LLM of OpenAI, or using the GPT independently copied by open source software or using other LLM, but as far as we know, at least they using the corresponding LLM.

This is not only a preliminary analysis and judgment from data science (mainly from the form) but also from smart system science (from the form and content, the principle of its existence and the method of its construction). Among them, the problems that need further study. In-depth study can be made from interpersonal, man-machine and inter-machine (between machines) separately or even in combination. Let's compare the above two examples of

human-computer interaction and even cooperation and mutual assistance to see how individuals and interpersonal people think, understand and deal with the same topic or theme:

### 2.3. *The third group is the self-questioning and self-answering (Jiang in Chinese and Zou in English)*

**【 Theme 】** Everything is counted, and counting leads everything; The value of data lies in decoding--Data Association of Fusion Intelligence or Rongzhixue and Examples of Introducing Great Inventions **【 Outline 】** First, the development of mathematics leads to a new civilization, and data + communication can eliminate risks. Second, venture capital VC is not universal, and risk-free PE is necessary and sufficient. Third, the great invention PE is ready, inviting angels to show miraculous effects and create the future.

**【 Text 】** 2.3.0.[Abstract] Everything counts, which is a thought-provoking remark specially recommended by Professor Congyao Zhou, a mathematician in China. Counting everything is the personal experience of the author of this article, which is recognized because he has made scientific inventions for more than 50 years and repeatedly felt that "mathematics is the mother of inventions" Data is the only output of mathematical processing. Inventions need data, and later they need it even more. What is the data? How to use it? He would like to discuss this openly. Data fusion is the experimental goal of the second author of this paper, which is related to the communication effect of fusion of intelligence. Pro-selection and promotion of demonstration projects of great inventions aims to promote them to the whole world quickly and contribute to human development. The data contains value, is the coverage expectation high? Can test values and methodology, welcome to discuss!.

2.3.2.First, the development of mathematics leads to a new civilization, and data+communication can eliminate risks.

6000~4000 years ago, ancient Mesopotamia and ancient Babylon developed from clay chips.

A counting system based on cuneiform characters was developed and used in 2000. The decimal counting of Arabic numerals, which was invented by ancient Indians and spread by Arabs, was finally spread all over the world.

2600 years ago, ancient Greece entered the boiling stage of culture and science. They admire geometry and regard it as noble. On the door of Plato's College, it is engraved that "those who don't learn geometry are not allowed to enter".

1200 years ago, the Persian Hua Lazimi's Summary of Reduction and Cancellation Calculation initiated algebra. He solved the problem in an abstract way independent of the problem, which is more universal.

500 years ago, the Renaissance inspired European masters such as Descartes and Poincare, and advocated the idea that "mathematics is an art that gives different things the same name" to innovate. In 1591, Weida published "Introduction to Analytical Methods", which became a new milestone. His "algebraic modernization" plan, together with Descartes' expression norms, makes algebra independent of geometry and acts as its nanny.

In 1623, Galileo even recognized that "mathematics is the mother of physics". Newton published Mathematical Principles of Natural Philosophy, and advocated that mathematics should take the road of "infinite and meticulous subdivision". He and Leibniz independently created "calculus", which was an epoch-making mathematical peak.

In 1654, Pascal and Fermat founded probability theory, which was the first in stochastic mathematics.

In 1834, Charles Babbage and ada lovelace cooperated to build the first computing device of Kakon program in history, so Lovelace was regarded as the first programmer in history.

In 1936, alan turing, a British mathematician, wrote a paper describing his imaginary Turing machine, whose calculation relies heavily on software algorithms. In 2016, the computer alpha dog trained by the new learning algorithm defeated the top Go players, which declared the new era of AI artificial intelligence.

The development of mathematics, from materiality to counting, from materiality to axioms and theorems, from questions to answers, from daily language to special specifications, has been abstracted step by step, becoming a more universal and refined basic science, and then going deep into various application fields of social humanities, closely combining with it and prospering.

In 1942, the cybernetics published by Wiener became a new starting point. In the following years, Bertalanffy's "System Theory" and Shan Nong's "Information Theory" were published one after another, and the "Three Theories of Modern Science" were formed, thus pushing the value and application of mathematics to a brand-new historical height.

This paper focuses on information theory. In 1948, Claude Shannon, an American scientist, published *Mathematical Principles of Communication*, which was the first theory for Information Theory and human "information civilization". He defined information as "the reduction of uncertainty", which revealed the essence of informatics tools of mathematics and data for the first time, and thus established the most direct connection with the sociality of human interests. The uncertainty of nature and society constitutes risks, and communication can convey the required information, so that risks can be eliminated in real time. In the equation of informatics, "information entropy" and "risk entropy" are quantitatively defined as

$$-\sum P(x_i)\log_2 P(x_i) \text{ and } -\sum P(x_i)\log_2(1/P(x_i))$$

The structure of the two is symmetrical, and the reciprocal sum of each term is zero, so the risk entropy can be calculated as controllable and zeroable.

The specific operation that risk entropy can be controlled and returned to zero is to open a communication program to obtain the required information as needed. By definition, it is to reduce uncertainty, and to reduce risk item by item is to eliminate uncertainty item by item. As long as communication is unimpeded, it can be reduced to zero. The understanding of reduced statistical probability is that the probability of  $P(x_i)$  is multiplied by  $1/P(x_i)$ , so that it becomes deterministic and the risk is eliminated. Can you eliminate the specified item? Whether it can be carried out item by item until it is completely eliminated depends only on the communication procedure. When the communication can be carried out as needed until the uncertainty is completely eliminated, it is said that the risk can be removed.

### *2.3.3. Second, venture capital VC is not universal, and risk-free PE is necessary and sufficient.*

Throughout history, people all over the world have been troubled by various uncertainties of nature and society, including: repeated devastating threats.

The research of British historian Toynbee found that most ancient civilizations in human history have been destroyed, and the reasons are: not understanding risks, not paying attention to innovation and reform to deal with risks. Therefore, information theory can be called a historic breakthrough, which should guide mankind to overcome the unsustainable crisis and open a scientific road to innovation and civilization.

There are two specific goals of this paper: first, it should be released to the public for the first time in the world, and a kind of new technology project that can be initially demonstrated to be sufficient to deal with and eventually overcome the contemporary global unsustainable crisis should be urgently promoted. Obviously, this should be classified as a subversive big invention; The second is to understand the original meaning of risk with the new theory and perspective of financial intelligence, citing information theory as the scientific premise, or to formally prove and arrange experiments to demonstrate its simple process: most secular risks can be quantified and eliminated. Eliminate risks and turn risky things into risk-free things,-----.

The first author of this paper advocates overcoming the unsustainable crisis with groundbreaking inventions.

The problem that this paper should especially point out and focus on is that information theory, as the basis of high-end applied mathematics and future civilized science, has been studied, studied and understood by very few people from all walks of life in contemporary society, including scientific and technological academia.

### *2.3.4. Finally, .*

Everything is counted, and everything is counted; The intelligent entropy of data depends on decoding.

-Data Association of Fusion Intelligence and Examples of Introducing Great Inventions (1)

First, the development of mathematics leads to a new civilization, and the closed loop of data+decoding is determined.

Second, venture capital VC should be improved, and risk-free PE is scientific and feasible

Third, the great invention PE is ready, and the miracle effect of the Angel Exhibition is about 4.0.

It is suggested that the concept of "intelligence entropy/ the entropy of wisdom" should be defined for " the fusion of wisdom/integrating intelligence"

The goal of the fusion of wisdom science is defined as a kind of value application of information (including objective information, but also philosophical concepts such as values and methodology), such as the realization of the business value of market economics that can be counted, and the realization of the value of social development and civilization progress that can be counted, but with more dimensions and more complicated methods, or even to be defined. Then the statistical average value increment of the application value of information is a pan-functional variable of wide space-time, which can be defined as intellectual entropy. The calculation formula of intellectual entropy can be derived by referring to the definition method of information entropy given by Claude Shannong and introducing the operation of the incidence matrix of value realization statistics.

By introducing the concept of intellectual entropy/ the entropy of wisdom, wisdom becomes the target concept of quantifiable measurement. Then, data is defined as the pan-functional of state or process information coding, and decoding information is defined as the pan-functional variation of data decoding mapping. Then the original information, coded data and decoded information can all be analyzed as the functional of the positioning mapping of the communication random process, and its corresponding intellectual entropy becomes the random functional of self-changing or dependent, and all become measurable, computable and controllable quantitative targets.

By using the concept of intellectual entropy/ the entropy of wisdom, the target wisdom of the science of fusion of intelligence is transformed into a variable of intellectual entropy with quantifiable measures and analyzable measures. This will be conducive to the in-depth study of the theory of financial intelligence and its value discovery and application promotion, and the empirical judgment of humanities can be reduced. The study of the theory of fusion of intelligence may be more complicated, but it can use the concepts and principles of mathematics and informatics more deeply and conveniently, and its specific application program may be simplified and easier to be understood by the society, so the promotion speed can be accelerated.

Professor Xiaohui is hereby suggested. If you think this suggestion is reasonable and feasible, please organize a new team to conduct in-depth research and publicly develop the paper results. I can cooperate with the launch of many great inventions in submerged state, and provide the data of technical and economic characteristics indicators (all of which are orders of magnitude shocking, not increasing percentage or doubling or doubling) to evaluate the value of intelligence integration one by one. The commercial market capacity and even annual benefit of each of these great inventions can reach the order of trillions and hundreds of billions. I have argued that the plan is to adopt the scheme of global patent registration law to ensure success. This is the biggest undertaking of our cooperation, which should be more important than sending academic papers and participating in TS competitions!

Please organize and manage it! I am really old. You are only over 60 years old. Please take care of it for at least 10 years. In 10 years, you will exceed one trillion yuan and enter the top ranking in the world. More importantly, it is necessary to overcome the unsustainable resource and environmental crisis of 3.0 civilization and lay the foundation for creating a new ecological civilization of 4.0. Then hand it over to the unparalleled innovation and entrepreneurship team that has been personally trained and grown up to take over!

Jiang Zigang, inventor and information scholar of many diving projects.

#### *2.3.5.Fourth,*

Rubbing--A rigid body rotates around one axis, which is called revolution, and at the same time rotates reversely around another parallel axis closer to its center of mass, which is called rotation. When the absolute values of rotation and revolution angular velocity are the same or similar, the two are combined into a translational or nearly translational motion, which is called rubbing. When the absolute value of the instantaneous angular velocity of the rotation and revolution of kneading/rubbing is always equal, it constitutes pure kneading/rubbing, and all particles on it move synchronously in a circle.

Kneading/rubbing Axis and Kneading/rubbing Center-The axis of the revolving motion of kneading/rubbing is called kneading/rubbing axis, and the projection of kneading/rubbing axis on its vertical plane is called kneading/rubbing center.

Kneading/rubbing diameter and radius — The diameter and radius of the revolution track of the rotating shaft are called kneading/rubbing diameter and radius. The diameter of the locus circle of each particle motion on a pure rubbing/rubbing rigid body is equal to the rubbing/rubbing diameter, and its linear velocity is equal to the product of the rubbing/rubbing radius and the revolution angular velocity. When the kneading/rubbing radius is very small, the speed of the kneading/rubbing line is very small, so the momentum moment and kinetic energy of the rigid body are greatly reduced and the distribution is uniform, and the motion loss is also reduced by orders of magnitude.



Kneading/rubbing wheel-a weight-reducing cylindrical part that makes kneading/rubbing motion, which is coaxially constrained to the eccentric shaft section of the crankshaft through a bearing. When the crankshaft rotates, the kneading/rubbing wheel revolves along with it and rotates due to inertia, forming kneading/rubbing motion.

### 3. Results and Conclusion

The result is that, not only the responses of the two software AI systems are completely different, but also the comparative advantages of the three research approaches are further discovered.

Rubbing internal combustion engine-a rubbing internal combustion engine with gas expansion working mechanism, is a rubbing fluid machine with additional gas generating parts, which is one of the important application types of the invention. It is mainly composed of a rubbing variable-volume mechanism, a coaxial-driven rubbing constant-ratio distribution pressurizing pump set, a timing nozzle and a synchronous constant-volume heating pulse combustion chamber. It has the advantages of high compression ratio, high efficiency, high power density, low pollution, no lubrication and long service life that traditional internal combustion engines can't match.

Kneading hydraulic engine-a potential energy-driven hydraulic engine mainly composed of kneading variable volume mechanism. Rubbing motor, a rubbing variable displacement engine directly driven by fluid pressure, is an important application type of rubbing fluid machinery, and hydraulic motor and pneumatic motor are designed respectively.

Rubbing pneumatic motor-a potential energy-driven pneumatic motor, which is mainly composed of kneading variable displacement mechanism, is the design type of gas phase working medium for rubbing motor, and the one equipped with pulse valve mechanism has the highest efficiency.

Rubbing hydraulic motor-a potential energy-driven hydraulic motor composed of a kneading variable displacement mechanism is a design type of liquid working medium for rubbing motor, which has much higher efficiency than traditional hydraulic motors.

Rubbing-type fluid pressurizing pump-a mechanical pump that includes a kneading variable volume mechanism and energizes the fluid, is an important application type of rubbing-type fluid machinery, and can be divided into liquid pressurizing pump, two-phase flow pump, compressor, vacuum pump, two-phase flow vacuum pump and other design or application types according to different media phases.

Rubbing compressible fluid pressurizing pump-a design type or application name of rubbing pressurizing pump composed of rubbing variable volume mechanism, which is used for pressurizing gas-phase and gas-liquid two-phase fluids.

Its significance lies in the fact that this study has caused us to think: is it only the difference of the response of the AI system based on API design in the foreground or the difference of LLM in the background? This is not only a problem of data science (mainly in form), but also a problem of smart system studied (including form and content, its existence principle and construction method) just like by using the STEAM. Looking back at the examples of how two software AI systems face the research topic of human beings, it is of great significance for many years of experimental results recorded in Chinese, English reporting and bilingual thinking. What needs to be emphasized is the third group, which is not so much the practice of interpersonal interaction as an attempt to improve the existing education and teaching practice in the era of man-machine mutual assistance.

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Important Appendix Added by Corresponding Author Xiaohui Zou

"Jiang Zigang and His Rubbing-Action Fluid Machinery

Published on: 2005-05-15 [From: [https://www.cas.cn/xw/kjism/gndt/200505/t20050515\\_1001052.shtml](https://www.cas.cn/xw/kjism/gndt/200505/t20050515_1001052.shtml)]

Editor's Note: The rubbing dynamics theory and technology introduced by Science and Technology Daily may seem incredible to many, yet experts believe it to be a monumental invention that, despite its eccentricity, is undeniably groundbreaking. Reporters attempted to seek further comments from more academicians, professors, and experts for a more authoritative and comprehensive evaluation, but to no avail.

It is understood that inventor Jiang Zigang recently demonstrated a prototype of the rubbing-action fluid machinery at Tsinghua University's Department of Engineering Mechanics and provided relevant professors with the derived mathematical equations for research and verification. The demonstration will also be showcased at the Beijing Science and Technology Expo opening on May 23. Jiang Zigang expressed his hope that this technology, which boasts complete independent intellectual property rights, high energy efficiency, and environmental friendliness with a broad range of applications, would first gain popularity in his homeland. He welcomed academia and industry to jointly study, discuss, and debate the technology.

On-Site Report: First Glimpse of the Rubbing-Action Prototype

'Mine disasters can be prevented and eradicated. The primary issues to address are ventilation and drainage. The emergence of rubbing-action fluid machinery will reduce the probability of mine disasters by one to two orders of magnitude from the current level,' said Jiang Zigang, the inventor, during a recent demonstration of the new product prototype held by Beijing Jujiang Technology Co., Ltd.

Mr. Jiang first introduced that this was the world's first universal rubbing-action fluid machinery, an innovative outcome purely derived from theoretical deduction. Every part of its design was directly calculated based on equations. Rubbing action, he explained, differs from reciprocal linear motion and rotary motion. It involves a combined movement of entrained revolution and counter-inertial rotation. The universal fluid machinery, meanwhile, possesses three primary characteristics: reversibility in function and direction, versatility in fluid phases, and continuity in operating parameters without lower bounds. In layman's terms, this machinery can function as a motor, water pump, compressor, vacuum pump, two-phase flow pump, two-phase flow vacuum pump, and high/low-pressure ventilator, with continuously adjustable operating parameters from zero to their maximum values, making it a highly adaptable multi-functional machine.

The reporter observed that the prototype of the universal rubbing-action fluid machinery appeared unremarkable: a

rectangular body roughly the size of a small water heater for household kitchens, with inlet and outlet pipes as thick as tea cups connected via flanges. The prototype's main shaft was equipped with a belt drive, driven by an internal combustion engine during the pump function demonstration.

During the pump function demonstration, Mr. Jiang noted that traditional pumps have preset parameters with limited adjustability. Operating beyond these parameters can render them inoperable or significantly reduce their efficiency. In contrast, this prototype, designed with a lift of 204 meters, could operate normally even at much lower lifts, as demonstrated on-site.

The prototype also exhibited two-phase flow pump capabilities. Mr. Jiang explained before the demonstration that a two-phase flow pump handles both gas and liquid simultaneously, with an adjustable gas-liquid ratio. This feature could be applied to mine safety, facilitating water and gas drainage. Traditional pumps, however, cannot handle two-phase flows. During the demonstration, the outlet pipe discharged a rapid stream of water. When submerged, the pipe emitted a burst of bubbles, indicating the presence of significant gas content in the extracted water.

The prototype's motor function was equally impressive. Upon connecting a regular water hose, the tiny stream caused the motor to rotate smoothly. Attempts to halt the pulley rotation by hand revealed significant torque, astonishing onlookers.

Other on-site demonstrations included compressor, vacuum pump, two-phase flow vacuum pump, and positive/negative pressure ventilator functions. Simple methods verified the pressure adaptability and linear regulation of flow rate and power in both pump and motor modes. According to Mr. Jiang, the data read from on-site instruments matched the design values to three decimal places, consistent with the instrument's precision.

Remarkably, the prototype's design and manufacturing process took only two months, costing less than 10,000 yuan, and succeeded in its first assembly test run.

#### Expert Commentary: Rubbing Action as an Effective Energy Conversion Method

Jiang Zigang's rubbing-action fluid machinery has proven its theoretical correctness through successful prototype demonstrations, but as it embarks on industrialization, doubts persist regarding its theoretical and technological validity. Is the machinery scientifically sound? Will it succeed in industrialization? With these questions in mind, the reporter interviewed Professor Jin Denian, a renowned thermophysicist who has taught at Tsinghua University's Department of Engineering Mechanics for decades, on May 9.

#### Does the Invention Conform to Scientific Laws?

Professor Jin addressed concerns about the invention's scientific validity, acknowledging the public's skepticism stemming from past pseudoscientific claims like water-into-oil. He affirmed that Jiang Zigang's rubbing-action fluid machinery adhered to scientific principles. Firstly, it does not create energy, thereby complying with the First Law of Thermodynamics. Secondly, it does not exceed the Second Law's efficiency limit, ensuring energy conversion within permissible limits.

#### Why is the Prototype More Efficient?

Professor Jin explained the prototype's efficiency, stating that rubbing action transfers and converts energy without generating high-speed motions, minimizing friction, stagnation, and other energy losses.

#### Originality and Potential Impact

Jin praised the invention's originality, noting that no existing machinery employs this motion method. He attributed this to human thought inertia, making it challenging to deviate from established patterns. Jiang Zigang's machinery, however, represents a fundamental change.

## Assessing Industrialization Prospects

Although Jiang Zigang's invention applies to various machines and phases, its full potential remains to be seen in practice. Professor Jin acknowledged the theory's versatility but emphasized the need for practical validation. Early successes in pump, vacuum pump, compressor, and wind power applications suggest promise, particularly in mine safety.

### Inventor's Response: Theory-Driven Innovation

Jiang Zigang addressed concerns about the rubbing dynamics theory's novelty and potential practical challenges. He emphasized the theory's rigor and the prototype's one-time success as evidence of reliable, theory-driven innovation. He welcomed visitors to the Beijing Science and Technology Expo to witness the technology's potential firsthand."

通讯作者邹晓辉追加的重要附录（引自：科技动态 > 国内动态）：

## 蒋子刚和他的揉动式流体机械

编者按 科技日报介绍的这一揉动力学理论和揉动技术，在很多人看来不可思议，而有专家认为这是一项看起来怪异但却毋庸置疑的特大发明。记者试图求教更多的相关院士和教授专家，得到更加权威和全面的评说，均无功而返。

据了解，发明人蒋子刚日前已将揉动式流体机械的样机放到清华大学工程力学系演示，并将所推导的数学方程式提供给相关教授，供大家研究和验证，还将在5月23日开幕的北京科博会上演示。蒋子刚表示，此举是为了能让这项具有完全自主知识产权的、高度节能高度环保而应用面又极为宽广的技术首先在自己的祖国“火”起来。希望和欢迎学术界和产业界共同研究、探讨和争鸣。

### 现场采访：初见揉动式样机

“矿难是能够避免和根治的，要解决的主要问题在于通风和排水。揉动式流体机械的诞生将使矿难发生的概率从现有水平降低1—2个数量级。”这是该机械的发明人蒋子刚先生近期在北京巨匠科技有限公司举办的新产品样机演示中所讲的话。

蒋先生首先介绍说，这是世界上第一台揉动式通用流体机械，是纯粹演绎理论的创新成果。其设计的任何一部分，都是他根据方程式直接推算出来的。他说，所谓揉动是一种有别于往复式平动和圆周向转动的运动方式，其运动机构由牵连性公转和逆向惯性自转合成；所谓通用流体机械，是指同时具有功能和方向可逆性、流体物相通用性和运行参数无下界连续性三大特性的新型流体机械。通俗地说，这种机械既可作马达用，又能作水泵用，还能当压缩机、真空泵、二相流泵、二相流真空泵和高低压通风机使用，其运行参数在0至最大值间可连续改变，因而是一种一机多能、适应性极广的新机器。

记者看到，揉动式通用流体机械的样机很普通：机体呈长方形，大小有如家庭厨房中使用的小厨宝，其出入口通过法兰盘连接着两根茶杯粗细的管道。样机主轴上装有皮带传动装置，演示泵类功能时由内燃机驱动。

在演示水泵功能时，蒋先生告诉大家，传统水泵的参数是设定的，只能在很小的范围内变化。如超过设定范围，将或者不能工作，或者效率严重下降。而这台样机设计扬程是204米，在扬程降到很低时也能正常运转。现场演示结果证实了蒋先生所说。

样机还具有二相流泵的功能。蒋先生在演示前解释说，二相流泵是指气和水一起走的泵，并且气液比例能够任意变化。这一特征可用于矿山安全防护——来水排水，来气排气。而传统的泵不能适应二相流。演示

时记者看到：出水管中流出了很急的水流。将该管子插到水中时，有一股气流喷涌为气泡溅冒，说明抽出的水中含有大量气体。

该样机的马达功能也非常灵敏。演示该功能时记者看到，接上普通自来水管后，流出的小小水流竟使该马达灵活地转动起来。有人试着用手制止皮带轮转动，感觉力矩很大。样机的马达功能令观看者普遍称奇。

现场演示项目还包括压缩机、真空泵、二相流真空泵、正压和负压通风机等功能，并用简易方法验证了泵方式和马达方式的压力自适应特性和流量与功率的线性调节特性。据蒋先生介绍，现场仪表测读到的数据与设计值达到3位数字吻合，与仪表精度表示的可信度相一致。

据介绍，这台揉动式通用流体机械样机的设计制造过程历时仅2个月，动用资金不到1万元，并且一次组装试车成功。

专家评说：揉动是一种很好的能量转换方式

蒋子刚发明的揉动式流体机械由样机的演示成功证明了其理论是正确的，但由于刚刚步入产业化实践，人们对他的理论和技术正确与否难免怀有种种疑问。该机械是否符合科学规律？在今后产业化中能否成功？带着许多问题，记者5月9日采访了在清华大学工程力学系任教几十年的著名热物理学家金德年教授。

发明是否符合科学规律？

揉动式流体机械的发明是否符合科学规律？会不会是前几年发生的水变油等笑话重演？金教授回答说，由于现在社会上“发明”太多、太滥，很多人都大言不惭地说自己是发明家，所以一提到原始创新，人们会联想到几年前水变油等违背科学规律的所谓发明创新，人们的这种心情可以理解。具体到蒋子刚发明的揉动式流体机械，我认为是符合科学的。首先，该机械不是一个创造能量的机器，如果说它是创造能量的机器，那就违反了热力学第一定律，是反科学的，不能相信它。

第二，它不是一个在能量转换过程中效率大于1的机械，如果那样就违反了热力学第二定律，该定律表明：能量的转换是有方向性的，它的转换和利用是有极限的，超过这个极限是不可能的。而这两个最基本的科学规律蒋子刚都没有违反，所以不能说发明的揉动式流体机械是不科学的。

揉动式流体机械的样机是蒋子刚用牛顿力学理论演绎出来的，样机看起来确实比已有的机械产生的效率高，为什么会有这样好的效果？金教授说，其实道理比较简单，它是在揉动之下传递能量和转化能量的，而揉动时所有工作介质的质点在能量转换过程里没有产生高速的运动，也就是说在揉动腔里，每一个质点都在做低速运动，不会产生高速摩擦、高速滞止这类能量的消耗，因此损失量很小，能量转换的效果自然比较高。

金教授还说，蒋子刚发明的揉动式流体机械属于原创性的发明，迄今为止，历史上所有的机器都不是采用这种运动方式。为什么别人没有想到这种方式？这是因为人的思维是有惯性的，不容易从根本上抛弃前人的模式。搞发明总是脱不开原有的思路，所以效率没有根本性的变化，而蒋子刚这个机械有根本性的变化。

如何估量产业化前景？

据发明人介绍，揉动技术可用于内燃机、泵、马达、压缩机等多种机械上，适用于气相、液相及多相工质。但他本人还来不及进行这些机械的实践，人们凭何相信他的说法呢？金教授对此回答说，蒋子刚的揉动式流体机械是在由他首先提出的揉动力学基础上开发成功的，而揉动力学原理是通用的，理论上可用在上述各种机械上。但在具体应用中，各种机械自然会有各自不同的性能要求，而初步的实践表明，这些在技术上似乎并不难解决。现在，他的样机已验证了作为水泵、真空泵、压缩机及风力发电设备等试用是成功的，看来在解决矿井安全问题上也将会是非常有效的，它可把井下产生的瓦斯和透水及时排出来，为杜绝我国近年来频

频发生的矿难事故提供了一条颇具希望的解决途径。当然，最终成功还有待于在产业化实践中加以验证。

发明者答疑：源于理论的创新最可靠

揉动力学理论史无前论，看起来有些怪异。记者带着许多问题现场采访了揉动式流体机械的发明人蒋子刚先生，他一一作了回答。

记者：发明揉动式通用流体机械的初衷是什么？

蒋子刚：传统流体机械只有直线平动和转动两种运动方式，产生了效率不高、污染环境、不通用等问题，其共同的缺点是：运动线速度太高，内机械损耗和水力损耗因而过大。虽然中外科技人员在不断地进行改进，由于没有根本性的突破，改进的空间已越来越小。本人觉得，降低机构运动速度是突破流体机械技术瓶颈的关键，揉动运动方式和揉动力学理论的最初萌发，均源于“把速度降下来”的设想。

记者：说它是世界首台揉动式通用流体机械，有何根据？

蒋子刚：揉动力学理论和揉动式流体机械是推导牛顿力学的结果。揉动力学包括机构运动学、机构动力学、流体动力学、可压缩流体热力学等内容，但这些学科中原来又都没有揉动的内容，因而是学科交叉后创新的特别成果。本人从牛顿、伯努利等方程出发，导出了 80 多个用于定量分析的方程，专利文档中发表了 10 个方程，名词术语定义占 8 页多。这在申请专利前就通过查阅国内外资料而认定为史无前论的创造了。依据这种原创性理论设计的机器，应该算得上是首台。

记者：有些专家在阅读了您的揉动力学理论后，认为虽然在理论上无懈可击，但实践中未必成功，因为以往的发明成果都要经过实验室—小试—中试—产业化的全过程，您如何看待这一说法？

蒋子刚：发明创造有两种途径，一种是先从实践中摸索，反复试验，然后选优和归纳出技术方案；另一种是用理论指导创新。我认为后者才是捷径。揉动式流体机械样机设计制造一次成功，说明了源于理论的创新最可靠和消耗性过程最短的道理。揉动技术将在北京第八届科技博览会上展出，欢迎大家前往参观。

记者：揉动式流体机械有哪些特别之处？

蒋子刚：揉动式流体机械基于创新的揉动变容运动。其功能运动与机构质点运动相分离的特点，使得实际的运动速度降低了一个数量级，从而产生了机构摩擦损耗、水力损耗和可压缩流体热力损耗特性的数量级优势。这种新式流体机械最特别之处还在于能实现任何一种流体机械的功能，并且运行参数可变。较之现有技术，其工作效率大幅度提高，而制造成本的降低幅度则可能超过 50%。

记者：揉动式流体机械应用前景如何？

蒋子刚：揉动式流体机械技术适合于内燃机、泵、压缩机、马达、传动、空调制冷、流体计量和控制等领域应用。揉动机构的速度、动量矩、损耗率较同转子降低 90—99%，由此产生了优良的运行特性，因而具有巨大的技术经济优势。申请专利后短短三个多月，我们完成了多种揉动式流体机械的应用设计。其中，“揉动式高适应性风力发电系统”和“揉动式二相流热泵压缩机”已经分别签约许可深圳和湖南的企业实施。被称为“七级浮屠工程”的“瓦斯、透水、冒顶类矿难事故防治系统”是揉动技术的一项特别应用，其设计目标是根治矿难。依据论证，该系统可以实现井下无电源一体化通风排水，在对付 u 型、δ 型压力瓦斯喷发及透水事故方面具有理论上的完备性。该系统已完成方案设计，正处于具体技术设计阶段，并于日前与山西的一家企业签订了实施许可合同。