

Prof. Shouqi Yuan is a leader in the field of irrigation and drainage machinery, and he has achieved representative results in the fields of theory of agricultural submersible pump, theory and technology of high-efficiency centrifugal pump, and new agricultural water-saving irrigation equipment.

He created the non-overload hydraulic design theory and the enlarged flow design method to increase the pump efficiency by 2%-8% of submersible pumps. He established the constraint equation system of non-overload hydraulic design theory for the first time all over the world, which is widely used in the entire industry. He conducted systematic research on the key technologies, series products and standards of submersible pumps, and more than 400 types of submersible pump series products in four categories were developed. Nearly 1,000 companies across China were supported by the technology transfer, accounting for about more than 60% of the China's total submersible pump output, with an annual output of more than 10 million units, which are widely used in farmland irrigation and the Three Gorges Project, the largest hydropower station in the world. It has made outstanding contributions to China's submersible pump industry. This achievement won the second prize of National Science and Technology Progress Award in 2007.

He revealed the unstable flow mechanism of the cavitation inception and rotor-stator interaction in centrifugal pump and the key scientific problems of high efficiency and high cavitation performance design were overcome through the optimization design of impeller blade geometry and the inducer technology. The multi-condition hydraulic design technology of centrifugal pump was proposed and created, which supplied design solutions for products with the requirement of 3 to 5 working conditions in the pump industry, and the weighted average efficiency is increased by more than 2 percentage points. For the low operation efficiency problem of centrifugal pump system, he established an operation model by adjusting pressure which can save more than 15% energy. The research results have been widely adopted by the pump companies, leading the technological development of China's pump industry. This achievement won the second prize of National Science and Technology Progress Award in 2014.

He revealed the influence of the technical parameters of light-small irrigation units

on energy consumption indicators, developed a series of multi-functional spray equipment, invented the gap-controlled complete fluidic sprinklers and variable-rate sprinklers, and solved the industrial problems such as the complexity of driving mechanism for traditional sprinkler. A new type of flow-ejecting self-priming spray pump is proposed, which breaks through the bottleneck that efficiency and self-priming performance are difficult to improve at the same time, the efficiency is increased by 5-9 percentage points, and the self-priming time is shortened by 20%. More than 10 new type light-small sprinkler irrigation systems and products with low energy consumption have been developed, and 2 patents in United States are granted (Double-nozzle injector capable of spraying evenly at medium and low pressure, PCT/CN2013/075983, US 9,770,729 B2, 2017-09-26 and Detachable frame of light-small sprinkling machine for precise irrigation, PCT/CN2016/076438, US 10,375,905 B2, 2019-08-13). This achievement won the first prize of Science and Technology Progress Award of the Ministry of Education of China in 2011 and the first prize of China Agricultural Water Saving Technology in 2012.

In response to the low efficiency of large irrigation and drainage pumping station projects, he innovated hydraulic design methods and developed a series of high-efficiency hydraulic models and vertical pump devices, which are widely used in the South-to-North Water Transfer Project (approximately 70% of domestic models in east route) in China and other large-scale water conservancy projects. This achievement won the first prize of the 2018 China Industry-University-Research Cooperation Innovation Achievement.

He has supervised more than 200 masters, doctors and postdocs, and one of them has won the Top 100 Outstanding Doctoral Dissertations Award in China. He was also awarded the title of "Top Ten Graduate Supervisors" in Jiangsu Province, China. As the chief contributor, he has won 2 second prize of National Science and Technology Progress Award, 1 second prize of National Teaching Achievement Award and 4 first prize of provincial Science and Technology Progress Award. He was granted 2 US invention patent authorization and 98 Chinese invention patent authorization. He is working as the member of ISO technical committee for irrigation and drainage

equipment and systems (ISO/TC 23/SC 18), and developed 11 national and industry standards for water pumps and water-saving irrigation equipment in China. He published 296 papers as the first or corresponding author, of which 90 and 167 papers were indexed by SCI and EI database respectively, and 13 books were published.

As the discipline leader, he established the National Research Center of Pumps of China and the National Center for International Research on Energy-Saving Technologies of Fluid Engineering Equipment of China. He has long served as the vice chairman of the Chinese Agricultural Machinery Society and the Chinese Agricultural Engineering Society. He also served as vice chairman of Asian Society of Agricultural Engineering, and is serving as a member of Asian Fluid Machinery Committee, a co-organizer of Symposium on Fluid Machinery of ASME Fluids Engineering Division Summer Meeting and the chairman of more than 10 important international conferences.

Based on Prof. Yuan's outstanding engineering accomplishments, he won the National Science Fund for Distinguished Young Scholars of China, the Ho Leung Ho Lee Foundation Science and Technology Achievement Award and the Leading Talents of the National Ten Thousand Talents Program in China. He also won the Asian Fluid Machinery Distinguished Engineer Award, the Meritorious Medal of Chinese Agricultural Machinery Industry for the 40th Anniversary of Reform and Opening, the Outstanding Figure in the 60th Anniversary of China's Development of Agricultural Mechanization and the Outstanding Contribution Award of National Agricultural Water-Saving of China, etc.