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Analysis and mathematical modeling of geothermal water influence to the efficiency of deep geothermal borehole with multistage centrifugal pump

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Hydrodynamic and thermodynamic processes of geothermal well extraction are investigated and presented. Mathematical models were developed for a deep suction multi-stage centrifugal pump and a piping system. The mathematical models were used to evaluate the gas (nitrogen) release from fluid and its effect on hydrodynamic processes. Investigation of the actual geothermal systems revealed the following problems: the dynamic water level, which changes during the transitional process (starting and stopping the pump) in a borehole, has influence on normal operating conditions of the geothermal system; geothermal fluid

is characterized by ever-changing properties due to a changing pressure and volume of released gas; the mass of fluid changes in each stage of the pump, the pressure and flow pulsations occur and vibration of mechanical elements is stimulated and cavitation can be generated. Through conducted experimental research and by applying mathematical modelling, it has been observed that the gas content in fluid increases the pressure and flow pulsations. Variation in height of a water column during the process of extraction has influence on characteristics of multistage centrifugal pump in wells.

Biography

Jolanta Januteniene is the professor of the Klaipeda University (KU). She is Engineer of science on Mechanical Engineering also PhD on Physical Science (Mathematics). She is a head of study programmes Mechanical engineering (bachelor level) and Production engineering (master level). She participates in activities of PhD studies in Transport Engineering science field. She has published more than 20 papers in reputed journals (refereed in SCOPUS) and has been serving as an editorial board member of journal Transport (VGTU).

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