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stability analysis, Bishop's simplified method, cohesive strength

Urban Hydrogeology of Tomsk, Rusia

Vitaly Pokrovskiy (Tomsk Polytechnic University, Russia); Pokrovsky D (Tomsk State University, Russia); Dutova E (Tomsk Polytechnic University, Indonesia)

Abstract: The hydrogeological conditions of the Tomsk are determined both by natural factors and the impact of the urban infrastructure. Important controls on subsurface water flows are complex hydraulic relationship of several geological layers and the ancient and modern relief. Increasing groundwater abstraction has generally led to lowered piezometric heads in the deeper aquifer horizons, while in the uppermost horizons, rises in the water table and formation of new perched water tables are experienced due to leaking pipes and impedance of groundwater flow by deep foundations. Special attention is paid in this paper to the Quaternary aquifer complex. Barrage effects of pile foundations and the intensive development of perched water distributed on flat surfaces of the watersheds and high terraces, complicate conditions for the construction and operation of facilities, leading in some cases to emergency situations.

Mathematical Modeling of Sintering the Uranium Dioxide Fuel Pellets in High Temperature Furnaces

Alexander Bovsunovsky, Timur Rakhimov, Victor Solonenko and Alexey Yashchuk (Tomsk State University, Russia), Alexander Lysikov, Evgeny Mikheev, Nikita Dyagterev, Oleg Bahteev (A. A. Bochvar All-Russian Scientific Research Institute for Inorganic Materials)

Abstract: The article presents the results of the sintering process modeling, which is numerically implemented using the finite volume method. The characteristics of the fuel pellets obtained by simulating various sintering conditions are presented. The results are compared with experimental data. The calculations are made for Pressurized water reactor (PWR) fuel pellets with different periods of sintering, hydrogen consumption and temperatures in different zones of the furnace. Influence of values "raw" density of pellets, oxygen-coefficient, dew point, and the presence of a tablet of uranium oxide (U₃O₈) in the assumed model is taken into account by using different sintering principal curves obtained on the

basis of the analysis of experimental data. The built model allows to determine the thermal conditions inside the sintering boat at any time

Linear Synchronous Electromagnetic Machines and Their Control Principles

Yury Morozov, Vladimir Neyman and Lyudmila Neyman (Novosibirsk State Technical University, Russia)

Abstract: Linear synchronous electromagnetic impact machine designs as a part of progress trend are considered where the head reciprocal motion is synchronized with 50 Hz power source pulses frequency applied to a winding or a system of windings. On the base of identified differences of the head forced mechanical oscillation processes merits and demerits of the work cycles of single or two-winding synchronous machine design variants are analyzed. Synchronous electromagnetic machines of a new design and principles of their control in a work cycle are presented. The specific half-wave interleaving of voltages applied to the windings allows to reduce current amplitude and the influence of the impact drive on the power grid. To improve forced oscillation mode stability and precision the new engineering solutions improving machines performances and exploitation conditions are proposed.

Effects of Rare Earth Element Samarium on Shear Strength and Interface of SnAgCu-XSm/Cu Joint

Gongge Meng (Harbin University of Science and Technology, P.R. China); Haiming Liu and Min Kang (Harbin University of Science and Technology, P.R. China)

Abstract: By using bonding shear strength tester, scanning electron microscope and AutoCAD software, the shear strength, fracture features, interfacial intermetallic compound morphology and thickness of SnAgCu/Cu joint are studied. The results show that the addition of rare earth element samarium into solder makes shear strength's reducing ratio get smaller during age and fracture surface dimple size tend to be uniform. Moreover, by adding rare earth element Sm, interfacial scallop-shaped intermetallic compound (IMC) is refined, uniform and smooth, and transition between the solder and copper substrate is moderate. Furthermore, the addition of element Sm slows down the IMC layer thickness growth during the process of aging. These indicate that the addition of rare earth