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Apr. 2011 Vol. 30, No. 4 Total Issue No. 345

**Pollution in the basin of east Liao River on normal water
period and the research of control measures**

DAI Lu-lu, DUAN Wei-ping, WANG Zhen-wu, et al
(Shenyang Jianzhu University, Shenyang 110168, China)

Abstract: From field sampling and testing in the east Liao River on normal water period, we measure 6 Indicators including temperature, PH, dissolved oxygen, chemical oxygen demand, ammonia nitrogen and total phosphorus. The results show that the content of chemical oxygen demand and ammonia nitrogen overweight by different level, that industrial point pollution and city sewage pollution have controlled, but it still exists in some areas, that agricultural pollution is the main pollutant source and shows increasing trend. Considering pollutant sources situation in East Liao River, artificial wetland technology is mentioned as pollution controlling solutions and feasibility analysis.

Key words: Liao River; the water quality; surface source pollution; artificial wetland; control

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**Research for distributed energy system and
configuration analysis**

MA Yue, DONG Zhou
(Hebei Electric Power Design & Research
Institute, Shijiazhuang 050031, China)

Abstract: Introduced the distributed energy station and CCHP(Combined Chilling Heat and Power) and policies in China. The article analyzed some founded distributed energy stations in and out of China, and discussed main principles which could be used for rational configuration according to power, chilling and heat load. However, there are some key questions to be settled, which makes suggestions for designing and research of distributed energy system.

Key words: distributed energy station; gas turbine; gas engine; CCHP

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**Performance study of desulfurization efficiency and
mass transfer in a liquid-screen wet
fuel gas desulfurization system**

SUN Zhong-wei, ZHOU Qu-lan, HUI Shi-en, et al
(Electric Power Business, Guangzhou Development
Industry(Holding) Co. Ltd., Guangzhou 510623, China)

Abstract: A new liquid-screen gas-liquid two-phase flow pattern with discarded carbide slag as the liquid sorbent of sulfur dioxide (SO₂) is presented in a wet fuel gas desulfurization (WFGD) system. The desulfurization performance, the gas-liquid flow characteristics including jet height, coefficient of resistance, and mass transfer characteristics of the liquid-screen WFGD tower were investigated in this experiment. On the basis of experimental data, the effects of the desulfurization efficiency with fuel gas flow rate, slurry flow rate and liquid-gas ratio were investigated. The jet height and resistance coefficient increased when liquid-gas ratio increased. The jet height increased while the resistance coefficient decreased when the liquid Reynolds numbers increased. The increased recycle slurry flow rate and liquid-gas ratio enhanced the desulfurization efficiency; however, the increased fuel gas flow reduced the desulfurization efficiency. A non-dimensional mass

transfer model was developed based on the available experimental data. The research in this paper provides a necessary quantitative understanding of the hydration kinetics of sulfur dioxide in the liquid-screen wet fuel gas desulfurization system which is essential for the practical application.

Key words: liquid-screen gas-liquid two-phase flow; wet fuel gas desulfurization; mass transfer; desulfurization efficiency

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**Experimental research into optimization on the distance
between pipe and nozzle of the jet bubble generator**

HUI Heng-lei, QIU Xing-qi, ZHANG Jian-wei, et al
(Dept. of Process Equipment and Control, China
University of Petroleum, Dongying 257061, China)

Abstract: Jet bubble generator is one of the bubble production devices in manufacture bubble technology of gas entrainment, the distance between pipe and nozzle is one of the most important Structural parameters in the jet bubble generator. According to the theory of liquid-gas jet pump technology, this article designs two structures bubble generator, uses a new experimental method on the distance between pipe and nozzle. The new method uses high-speed CMOS area array camera system to generate the flow measurement of air bubbles, Analyzes the bubble diameter with the variation from the distance between pipe and nozzle at different test conditions, finally gets the size of the best distance between pipe and nozzle. In this paper, the best distance between pipe and nozzle can form bubbles in the small diameter and number of mobile and stable bubbly flow in the bubble generator. The results show that, the best distance between pipe and nozzle is in the range of 5 - 10mm, that is 1 to 2 times the length of the nozzle outlet diameter. The best distance between pipe and nozzle from the determination in the optimal test will give the design value of the distance between pipe and nozzle on the jet pump and the jet nozzle.

Key words: jet bubble generator; distance between pipe and nozzle; bubble diameter; high-speed video camera

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**The Application of the Genetic Algorithm
in Optimizing of Hydrogen Network**

CHEN Guang-fei, HUO Zhao-yi, YIN Hong-chao, et al
(School of Energy and Power Engineering, Dalian
University of Technology, DaLian 116023, China)

Abstract: Hydrogen networks in refinery are optimized by using the genetic algorithm. The model of hydrogen network is built by using superstructure, the optimization goal is the minimal annual costs, and operating cost of pressure swing adsorption and the value of fuel gas produced by hydrogen network system are taken into consideration. The algorithm could avoid the local optimal solution, which could quickly get hydrogen network structure and parameters, and be able to obtain the global optimal solution. The method is used to calculate one example to prove its feasibility.

Key words: system optimization of hydrogen network; genetic algorithm; sources of hydrogen; sinks of hydrogen; superstructure

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**Intelligent control and simulation study of variable frequency
VAV for constant air volume all-air air conditioning system**

ZHANG Xue-dong, WANG Cui-hua
(North China Electric Power University,
Baoding 071003, China)

Abstract: From analyzing the characteristic of an air-conditioning room in constant air volume all-air air-conditioning system, a mathematical model of the air-conditioning room was derived, and the room simulation model was established by using Matlab / Simulink toolbox. Three controllers including PID controller, fuzzy controller and neural network controller are made. By using Simulink toolbox of Matlab software, performances of these three controllers are compared.

Key words: variable frequency air-conditioning; fuzzy control; neural-network control; air-conditioning simulation

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Numerical simulation about the pulsate combustion process of low concentration gas

ZHAO Zhi-hong, YUAN Long-ji, DING Yan, et al
(College of Electronic Engineering, China University of Mining and Technology, Xuzhou 221008, China)

Abstract: The pulsating combustion process of low concentration gas was simulated in the Helmholtz pulse combustor using $k-\epsilon$ turbulence model, probability density equation turbulent combustion model and partially premixed combustion model. Through analyzing the distribution of pressure field and velocity field, the conclusion was obtained that the numerical simulation results agree with actual pulse combustion rule and it is practical and helpful to the utilization of low concentration gas by the way of pulsating combustion. Besides, the results can provide the reference for the later research.

Key words: low concentration gas; pulsating combustion; numerical simulation

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Experiment study on the regeneration of ANJ. SiC by different chemicals

JIANG Yang, MENG Jian-jun, LI Hong-bo, et al
(School of Municipal and Environmental Engineering, Shenyang Jianzhu University, Shenyang 110168, China)

Abstract: Through the experiment study on the regeneration of ANJ. SiC with Mn^{2+} adsorbed by different chemicals, the optimum regenerant was selected. In the same condition, regenerated the saturated ANJ. SiC by HCl, HNO_3 , CH_3COOH , NaOH, KOH, NaCl, $CaCl_2$, NH_4Cl , $FeCl_3$, $Al_2(SO_4)_3$, $MgSO_4$, HDTMA and C_2H_5OH separately, and comparatively analyzed the results. The test result shows that the Na^+ containing chemicals has the better regeneration effect. Under certain conditions, the regeneration rate of ANJ. SiC can reach over 114%. By the analysis of SEM figures, the surface porosity of ANJ. SiC increases, and the surface chemical properties improves in a large extent after regenerated by the Na^+ containing chemicals.

Key words: the saturated ANJ. SiC; manganese ions; the Na^+ containing chemicals; the regenerant

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Influence of inductance and resistance on voltage of bus bar of DC-ERTG

WANG Xu-chang, SUN Bin, TANG Xin-zhou
(ABB(China)Limited Corporation, Shanghai 200001, China)

Abstract: Constant DC voltage on bus bar is essential to the operation of DC-ERTG. The influence of resistance and inductance on the voltage of DC bus bar is tested on a scale system. Simulation was carried out for a real DC-ERTG system. Results could be useful to design of similar system.

Key words: RTG; DC bus bar; voltage

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Hydro-X boiler water regulator in heating unit the application and energy-saving analysis

ZANG Dian-rong
(Shandong Guangming Heat & Power Co. Ltd., Taian 271221, China)

Abstract: The traditional boiler anti-scaling treatment using phosphate processing mode, through retaining stoves water content, root phosphate in boiler operation conditions generating alkali type calcium phosphate water dregs along blowdown platoon walk, but its blow-down rate is high, waste a great amount of calories and high quality of boiler water. By adopting management-X boiler water regulation tech-

nology substitution phosphate dosing mode, and effectively suppress the soda boiling, during the guarantee of quality steam premise, improves the boiler water enrichment ratio, which reduces the boiler emission rate, raise the yield of the quantity of steam boiler, achieved the purpose of saving energy and reducing consumption, have the heating units in popularizing widely application value.

Key words: boiler; water regulation; phosphate processing; emission rate; enrichment ratio; energy-saving

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300MW power unit MFT interlock after the turbine and boiler optimization program

HAO Peng
(Guodian fengcheng power generation Co., Ltd., Fengcheng 331100, China)

Abstract: The safety of boiler plays an important role for the plant's continuous operation. The boiler MFT is the most common accident in a thermal power plant, the incidence of MFT accounts for 60% of the total power plant accidents. In the previous Turbine-Boiler-Generator interlock logic, So Fengcheng Power Plant cancel the circulation of the Turbine-Boiler-Generator interlock, turbine trip and generator disconnection from grid will not occur after the boiler MFT, and the generator will not disconnect from grid if turbine trip and the boiler MFT happens. In this way, the generator will not lose connection from grid under boiler MFT or turbine trip condition, and the production process can resume in a very short time.

Key words: MFT; turbine trip; disconnect; operate project

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The influence analysis of the building outside window on heating heat load

GAO Juan, CHANG Ru, LV Jian
(Energy Technology and Mechanical Engineering Department, Tianjin Institute of Urban Construction, Tianjin 300384, China)

Abstract: Taking a layer of office southing outside window a three layers of building in Tianjin as the research object, by calculating the heating season southing outside the window hourly total calories quantity of heat, and to analyze the different types of window for the whole of the heating season cumulative heating heat load effect.

Key words: window; load calculation; solar radiation

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The technology of the condensation water recycling in auto production enterprise
SHEN Lin-yan, ZHANG Hao, JIN Xiong
(SCVIC Engineering Corporation, Energy and Power Division, LuoYang 471039, China)

Abstract: Water steam as a heating medium is widely used in auto production enterprise. Using the cooling section of the air conditioning unit surface heat exchanger realize winter heating function, the original 110 °C hot water as a heating medium instead of 90 °C condensate as heating medium, not only can heat the air to required state, and can recycle the waste heat of the condensate. Condensate as car coating workshop process water and welding workshop of circulation water supplement, can effective recycling water. Recycle and reuse of condensate can be achieved good economic benefits.

Key words: condensate; waste heat utilization; recycle; energy-saving

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