

Identification and analysis of the source of high-frequency aerodynamic noise from the blade tip region of wind turbines

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Abstract. An acoustic array test was performed on the near wake sound field of a horizontal-axis wind turbine under different wind speeds and tip speed ratios, with the wind wheel rotation surface as the sound source plane. The distribution of high-frequency sound sources was analyzed using data from array microphones; the data were collected from all channels, and the beamforming algorithm was used for calculation. The results showed that the positions of the high-frequency sound source on the blades were mainly concentrated in a specific area. The distribution of the sound source was asymmetrical, and the positions of the sound source on the blade did not vary with the changes in the tip speed ratios and wind speed.

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Design of monitoring system for electrical fire disaster of high-rise buildings based on ZigBee

ZHANG LISHUO, WANG YIZE

Abstract. An overall fire-disaster monitoring system is designed, together with the terminal circuit, communication module circuit, method of configuration of its parameters, and design of terminal and PC software. Experiments show that the system has a high measurement accuracy, fast response time, and other advantages. The properties of the system play an effective role in prevention, reducing the complexity of projects and maintenance work intensity.

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Bearing performance of wallboard in electrostatic precipitator casing in consideration of stressed skin effect

HAIFENG QIAN, LICHENG PAN,
KAILI XING, DENG FENG WANG

Abstract. The influences of the structural factors on enclosing structure of electrostatic precipitator casing are analyzed. The casing consists of the stiffened steel wallboard and H-shaped steel column. The wallboard (connected with column by a continuous weld, which forms the entire structure that bears load) is subjected to reaction from column on the connecting edge when it plays stressed skin effect affecting the bearing capacity of wallboard under vertical pressure on top. The failure mode and bearing capacity for wallboard playing stressed skin effect are investigated by nonlinear finite element method. For the wallboard, the shear yielding failure occurs when the load level of column is low. Shear yielding failure and compression yielding failure occur simultaneously when the load level of column is medium. Compression yielding failure occurs when the load level of column is high. These factors are functions of the wallboard thickness, wallboard width, stiffener spacing, brace spacing of the column and column section size, and their investigation is the principal subject of this paper.

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Study on failure mechanism and bolt-mesh-spray-grouting composite support technique in weakly consolidated soft rock roadway

WANG WEI-MING, TIAN ZHONG-XI, LIU SHU-JIE

Abstract. The failure mechanism of weakly consolidated soft rock roadway is analyzed. Sensitive rock deformation often occurs in weakly consolidated soft rock roadway, because of poor cementation and low intactness of soft rock. The stepwise and composite support schemes are brought forward by numerical modeling and monitoring. The primary supporting scheme is bolt-mesh-spray and the secondary scheme is grouting-floor rock bolts-floor anchor beam. The results show that the surrounding rock deformations are less than 30 %, and steady time is reduced to 7 days compared to the primary plans.

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Research on key technology for coal mining, mullock backfilling and gob-side entry retaining

CAO LIANMIN, WANG CHAO, ZHANG FAN,
WANG PENGHUAI, CHEN LIANJUN

Abstract. A study of mining, filling and gob side entry retaining integration process and technology for Inner Mongolia is proposed because the previous extensive mode of coal mining would lead there to deterioration of the grassland ecological environment. Application of the new technology in the Great Wall coal mine is successful. It provides a new technical reference in safe and efficient production for Inner Mongolia mining area.

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Dual solutions in a stagnation point flow of a Casson fluid over a nonlinearly stretching sheet

SYAMANTAK HALDAR,
SWATI MUKHOPADHYAY, G. C. LAYEK

Abstract. The steady boundary layer flow of a non-Newtonian Casson fluid in the neighbourhood of a stagnation point over a stretching sheet is investigated. The sheet moves nonlinearly keeping origin fixed. Self-similar equation is obtained and the behaviours of dual solutions are analysed. The solution depends on the material parameter of the fluid. The fluid velocity decreases with the increasing values of nonlinearly stretching parameter. The boundary layer thickness is found to decrease as Casson parameter increases. It is interesting to note that the range of dual solutions is larger for non-Newtonian Casson fluid than that of Newtonian fluid. Also, the range of existence of dual solutions increases with increasing value of nonlinear stretching parameter.

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Entropy analysis for MHD dissipative Casson fluid flow in porous medium due to stretching cylinder

PARESH VYAS, SAHANAWAZ KHAN

Abstract. Entropy generation in MHD viscous dissipative Casson fluid flow and heat transfer over a stretching cylinder in the presence of porous medium is investigated. Similarity transformation is employed to convert the governing partial differential equations into ordinary differential equations which are then solved numerically by fourth order Runge–Kutta integration scheme together with shooting method. The effects of various parameters on the quantities of interest are presented through tables and graphs.

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Classification and model analysis of elastic tire

EKATERINA V. BALAKINA, NIKOLAI M. ZOTOV,
ALEKSEI P. FEDIN

Abstract. Classification and results of the analysis of different models of an elastic wheel are presented. It is established, that deformation models for the description of side slip not only do not demand experimental data, but also allow considering 10 factors at calculation. The comparative analysis of results of calculation of coefficient of road adhesion for different models at nonzero side force for the same coverings is carried out. The model by Pacejka rather precisely describes the process, but its use requires a large number of experimental coefficients for setting the tire model. Balakina–Zotov’s model are less exact, but for their use it is enough only to use sliding friction coefficient and static friction coefficient.

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