NATURE PHENOMENA AND INNOVATIVE ENGINEERING

Energy consuming control of building based on fussy temperature control

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Energy saving is an hot topic recently as the energy crisis is more and more serious. Among the energy consumer of the world, building is often ignored by many people. Nowadays many researchers noticed that research on the energy saving of building is meaningful, especially the research on the energy saving of air-conditioning. As the energy consuming of air-conditioning is very significant. Traditional control method of air-conditioning is based on PID. In the paper, fussy control is introduced and applied in the air-conditioning control, the result shows that response speed and accuracy of fussy controller are significantly better than PID controller.

Keywords: Energy consuming, Public building, Temperature adjustment, Air conditioner

Using cubature Kalman filter to estimate the vehicle state

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The vehicle state is of significant to examine and control vehicle performance. But some vehicle states such as vehicle velocity and side slip angle which are vital to active safety application of vehicle can not be measured directly and must be estimated instead. In this paper, a Cubature Kalman Filter (CKF) based algorithm for estimation vehicle velocity, yaw rate and side slip angle using steering wheel angle, longitudinal acceleration and lateral sensors is proposed. The estimator is designed based on a three-degree-of-freedom (3DOF) vehicle model. Effectiveness of the estimation is examined by comparing the outputs of the estimator with the responses of the vehicle model in CarSim under double lane change and slalom conditions.

Keywords: cubature Kalman filter, vehicle state, 3DOF, CarSim

The application of R/S analysis for the earthquake prediction in Sichuan, China

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Fractal is one of the powerful analysis for the study of complex natural phenomena. This paper employed fractal analysis in seismology based on the Statistical fractal concept and gave a simple overview to fractal characteristics of seismic activity in the spatio-temporal distribution. Analyzed by the R/S scale invariance of seismic time sequence and time interval sequence, this paper explored the self-shot fractal characteristics in the seismic activity.

Keywords: statistical fractal, earthquake, spatio-temporal distribution, R/S analysis method

Effect of 3-S-isothiuronium propyl sulfonate on bottom-up filling in copper electroplating

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The effect of 3-S-isothiuronium propyl sulfonate (UPS) upon the microholes filling by Cu electrodeposition was investigated by cross-sectional images using optical microscopy. The bottom-up filling of the electroplating bath was achieved with an addition of UPS. The electrochemical study indicated that the polarisation on the cathode was decreased with an addition of UPS. Furthermore, X-ray diffraction analyses showed the crystallography and the peak intensity ratio I(111)/I(200) of plated Cu film were decreased with addition of UPS. The results present UPS as an accelerator, which is beneficial for microholes filling for high density interconnections printed circuit board.

Keywords: Damascene copper plating, accelerator, Microhole filling

Study on signal processing technology based on the reflective intensity modulated fiber optic sensor

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Sensor technology is one of the most representative of the emerging technology. At present, the sensor has been widely used in national defence, industry, agricultural production, environmental protection, biological science, measurement, transportation, each field of automatic control and household appliances, etc.. Optical fiber sensing technology is accompanied by the development of optical communication technology gradually formed, compared all kinds of optical fiber sensor and the traditional sensor has a series of unique advantages, such as high sensitivity, anti electromagnetic interference, corrosion resistance, electrical insulation, explosion-proof, light path with the flexible, convenient for connecting with a computer, the structure is simple, small volume, light weight, low power. In this paper, the intensity modulation type reflective optical fiber displacement sensor, studied the basic principle, in fact, is the displacement measurement in particular, on the assumption that the condition of uniform distribution, the emergent light field is analyzed in detail, the expression intensity modulation function under various conditions were obtained.

Keywords: Algorithm, Fiber optic displacement sensor, weak signal processing, band-pass filter