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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Numerical assessment on improving multistage centrifugal impeller performance by changing inlet skew angle at impeller inlet		
Jumlah Penulis	:	7		
Status Pengusul	:	penulis ke-5		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Journal of Central South University of Technology
		b. Nomor ISSN	:	2227-5223 (Online), 2095-2899 (Print)
		c. Vol, No., Bln Thn	:	19, 4, April 2012
		d. Penerbit	:	Central South University (Springer Nature Switzerland)
		e. DOI artikel (jika ada)	:	https://doi.org/10.1007/s11771-012-1097-z
		f. Alamat web jurnal	:	https://link.springer.com/article/10.1007%
		Alamat Artikel	:	https://eprints2.undip.ac.id/1513/1/Numerical%20assessment%20on%20improving%20multistage%20centrifugal%20impeller%20performance%20by%20changing%20inlet%20skew%20angle%20at%20impeller%20inlet.pdf
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   Data cukup dan mutakhir. Metodologi eksperimental juga jelas baik sensitivitas terhadap mesh dan metode CFD nya. Kekurangan belum dilakukan validasi.

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Journal of Central South University of Technology (English Edition)
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Numerical assessment on improving multistage centrifugal impeller performance by changing inlet skew angle at impeller inlet (Article)

Labib, M.N.[a], Woo, J.-S.[a], Choi, D.-Y.[b], Utomo, T.[c], Fajar, B.[c], Chung, H.-S.[d], Jeong, H.-M.[d]

[a]Graduate School of Department of Mechanical and Precision Engineering, Gyeongsang National University, Tongyeong 650-160, South Korea
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Abstract

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Multistage centrifugal impellers with four different skew angles were investigated by using computational fluid dynamics. The purpose of this work is to investigate the influences of lean angle at the blade tip of the impeller inlet. Four variations of lean angles, that is, 8°, 10°, 15° and 20°, were made at first stage impeller. Reynolds Average Navier Stokes equation was used in simulation together with a shear-stress transport (SST) k-w turbulence model and mixing-plane approach, respectively. Three dimensional fluid flows were simplified using periodic model to reduce the computational cost and time required. A good performance was expected that the secondary flow can be effectively reduced in the flow passage of the impeller without excessive increase in manufacturing cost caused by the secondary flow. The results show that secondary flow affects the main flow intricately to form vortices or having non-uniform velocity in the flow passage, which in turn results in substantial fluid energy loss not only in the impeller but also in the guide vane downstream of impeller. The numerical solutions were performed and allowed the optimum design and operating conditions to be obtained. © 2012 Central South University Press and Springer-Verlag Berlin Heidelberg.

SciVal Topic Prominence

Topic: Centrifugal compressors | Centrifugation | Vaned diffuser

Prominence percentile: 88.640

Author keywords

Blade inlet skew angle | Computational fluid dynamics | Multistage centrifugal compressor | Secondary flow

Indexed keywords

Engineering uncontrolled terms: Blade tip | Centrifugal impeller | Computational costs | Flow passage | Fluid energy | Guide vane | Impeller inlets | Lean angle | Manufacturing cost | Multistage centrifugal compressors | Numerical solution | Operating condition | Optimum designs | Periodic models | Reynolds Average Navier Stokes equation | Shear-stress transport | Skew angles

Engineering controlled terms: Centrifugation | Computational fluid dynamics | Energy dissipation | Navier Stokes equations | Secondary flow | Three dimensional | Turbulence models

Engineering main heading: Impellers

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Jeong, H.-M.; Department of Mechanical and Precision Engineering, Gyeongsang National University, Institute of Marine Industry, South Korea; email:hmjeong@gnu.ac.kr

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Large scale synthesis of ZnO nanoparticles via homogeneous precipitation

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Abstract: In order to synthesize ZnO nanoparticles economically, industrial-grade zinc sulfate and urea were utilized to synthesize ZnO precursors in a stirred-tank reactor or a Teflon-lined autoclave at 100−180 °C under complete sealing condition. The ZnO precursors were calcined at 450 °C for 3 h to synthesize ZnO nanoparticles. The composition of the precursors and the formation mechanism of ZnO were studied by thermogravimetric analysis and Fourier transform infrared spectroscopy. The results of X-ray diffraction, transmission electron microscopy and scanning electron microscopy of the ZnO powders demonstrate that high-purity zincite ZnO nanoparticles are synthesized. Orthogonal experiments were performed to find out the optimal conditions for the maximum yield and the minimum size. The effect of temperature on the size of ZnO nanoparticles was investigated. The results show that a higher temperature is propitious to obtain smaller nanoparticles.

Key words: ZnO; homogeneous synthesis; sealing condition; thermogravimetric analysis

1 Introduction

Zinc oxide (ZnO) with excellent electronic, optical and photocatalytic properties [1−3] has attracted much attentions in recent decades. Many methods, such as homogeneous precipitation [4], sol-gel processing [5], hydrothermal synthesis [6−7], vapor deposition [8], decomposition of organometallic precursors [9], gas expanding method [10], vapor transportation [11], hydrothermal oxidative pressure-relief route [12], solvothermal hot press (STHP) method [13] and interphase synthesis [14], have been developed to synthesize ZnO nanoparticles. Several morphologies of ZnO nanoparticles, e.g. nanorings [15], nanohelices [16], nanowire or nanobelt [17], flowerlike nanorod [18−19], nanotubes [20] and cone-shaped nanoparticles [21], have been obtained.

For the deposition method, oxygen pressure is a significant parameter on the formation and morphology of ZnO nanoparticles. Using pulsed laser deposition, QI et al [22] studied the effects of oxygen pressure on crystallinity and surface morphology of ZnO films, and found that the surface morphologies depend significantly on the oxygen partial pressure. SINGH et al [23] reported the influence of oxygen partial pressure on the structural properties of the as-grown ZnO nanocrystalline thin films, and found that the films deposited at low oxygen partial pressure contained mixed phase (Zn and ZnO) and were randomly oriented while the films deposited at higher oxygen partial pressure were single phase (ZnO) and highly oriented along the *c*-axis. In the homogeneous precipitation, precipitators decomposed into acidic and/or alkali gases [24−25] at a high temperature, and the gases streamed out inevitably in the three-neck flask, and the yield of products became low. Therefore, it is necessary to reduce the loss of the gases in order to obtain a higher yield.

In this work, ZnO nanoparticles were synthesized utilizing industrial-grade raw materials via homogeneous precipitation under complete sealing condition. The composition of ZnO precursors and the formation mechanism of ZnO nanoparticles were studied via thermogravimetric analysis and Fourier transform infrared spectroscopy. The effect of temperature on the size of ZnO nanoparticles was investigated.

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Gravitational search algorithm for coordinated design of PSS and TCSC as damping controller

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Abstract: A newly developed heuristic global optimization algorithm, called gravitational search algorithm (GSA), was introduced and applied for simultaneously coordinated designing of power system stabilizer (PSS) and thyristor controlled series capacitor (TCSC) as a damping controller in the multi-machine power system. The coordinated design problem of PSS and TCSC controllers over a wide range of loading conditions is formulated as a multi-objective optimization problem which is the aggregation of two objectives related to damping ratio and damping factor. By minimizing the objective function with oscillation, the characteristics between areas are contained and hence the interactions among the PSS and TCSC controller under transient conditions are modified. For evaluation of effectiveness and robustness of proposed controllers, the performance was tested on a weakly connected power system subjected to different disturbances, loading conditions and system parameter variations. The eigenvalues analysis and nonlinear simulation results demonstrate the high performance of proposed controllers which is able to provide efficient damping of low frequency oscillations.

Key words: gravitational search algorithm; power system stabilizer; thyristor controlled series capacitor; tuning

1 Introduction

When large power systems are interconnected by relatively weak tie lines in late 1950s, low frequency oscillations (LFOs) have been observed. These oscillations may sustain and grow to cause system separation if no adequate damping is available [1−2]. Such dynamic instabilities impose unnecessary limitations on power system operation. To provide fast damping for system and thus improve the dynamic performance, an auxiliary control signal in the excitation system and/or the governor system of a generating unit can be used. As the most cost-effective damping controller, power system stabilizer (PSS) has been widely used to suppress the LFO and enhance the system dynamic stability. The PSSs contribute in maintaining reliable performance of power system stability by providing a supplementary signal to the excitation system. Recently, the conventional lead/lag power system stabilizers (CPSSs) are extensively applied by power system utilities to damp out small oscillations. However, determining PSS parameters is a crucial step in the design process. A comprehensive analysis of the outcomes of various CPSS parameters is introduced on the overall system dynamic performance of power system. Generally, it is agreed that the appropriate selection of CPSS parameters results in satisfactory performance during system upset. With growing transmission line loading over long distances, the request of PSSs might, in some cases, not provide enough damping for the inter-area power oscillations in a multi-machine system. In these cases, other efficient resolutions are needed to be investigated. Flexible AC transmission systems (FACTS) devices are one of the recent plans to alleviate such conditions by controlling the power flow along the transmission lines and improving power oscillations damping [3−4]. The application of FACTS controllers enhances the flexibility of operation by providing more options to the power system operators. One of the series FACTS devices for transient stability improvement is the thyristor controlled series capacitor (TCSC), which allows quick and continuous changes of the transmission line impedance [5]. TCSC has immense potential and application in precisely regulating the power flow on a transmission line, mitigating the sub-synchronous resonance, improving the transient stability and damping inter-area power swings. TCSC controllers help in enhancing and controlling the power flow through a line in the steady

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Application of fuzzy analytic hierarchy process and neural network in power transformer risk assessment

Wei-guo Li 李卫国, *Qian Yu 俞乾*, *Ri-cheng Luo 罗日成* Pages 982-987

18.

OriginalPaper

PAPR reduction in mobile WiMAX: A new ZCMT precoded random interleaved OFDMA system

I. Baig, *V. Jeoti* Pages 988-993

19.

OriginalPaper

Industrial shape detecting system of cold rolling strip

Li-po Yang 杨利坡, *Bing-qiang Yu 于丙强*, *Dong Ding 丁栋*... Pages 994-1001

20.

OriginalPaper

Penetration depth for yaw-inducing bursting layer impacted by projectile

Wan-xiang Chen 陈万祥, *Zhi-kun Guo 郭志昆*, *Qi-hu Qian 钱七虎*... Pages 1002-1009

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Zai-ming	LIU	School of Mathematics and Statistics	Central South University	Hunan	China
An-huai	LU	School of Geosciences and Info-	Central South	Hunan	China

		physics	University		
Di-fu	PAN	Traffic & Transportation Engineering	Central South University	Hunan	China
Yi	PAN	Department of Computer Science	Georgia State University	Georgia	USA
Chao-qun	PENG	School of Materials Science and Engineering	Central South University	Hunan	China
Wen-qing	QIN	School of Minerals Processing and Bioengineering	Central South University	Hunan	China
Guan-zhou	QIU	School of Minerals Processing and Bioengineering	Central South University	Hunan	China
Xiang-zhi	SONG	Chemistry and Chemical Engineering	Central South University	Hunan	China
Jing-tian	TANG	School of Geosciences and Info-physics	Central South University	Hunan	China
Honog-qi	TIAN	Traffic & Transportation Engineering	Central South University	Hunan	China
De-zhi	WANG	School of Materials Science and Engineering	Central South University	Hunan	China
Dian-zuo	WANG	School of Minerals Processing and Bioengineering	Central South University	Hunan	China
Fei-yue	WANG	Central South University Press	Central South University	Hunan	China
Chao	WU	School of Resource and Safety Engineering	Central South University	Hunan	China
You-jun	XIE	School of Civil Engineering	Central South University	Hunan	China
Bing-chu	YANG	School of Physics and Electronics	Central South University	Hunan	China
Chun-hua	YANG	School of automation	Central South University	Hunan	China
Hua	YANG	Central South University Press	Central South University	Hunan	China
Xiao-li	YANG	School of Civil Engineering	Central South University	Hunan	China
Qing-yuan	ZENG	School of Civil Engineering	Central South University	Hunan	China
Zhong-wei	ZHAO	School of Metallurgy and Environment	Central South University	Hunan	China
Hong	ZHONG	Chemistry and Chemical Engineering	Central South University	Hunan	China
Jue	ZHONG	College of Mechanical and Electrical Engineering	Central South University	Hunan	China
Nai-jun	ZHOU	School of Energy Science and Engineering	Central South University	Hunan	China
Jian-jun	ZHU	School of Geosciences and Info-physics	Central South University	Hunan	China
Sangmin	LEE	School of Electrical Engineering	Inha University	Korea	
Herbert W	Roesky	Institute of Inorganic Chemistry	University of Gottingen	Germany	