研究生:	朱良堃
研究生(英文姓名):	Liang-Kun Zhu
論文名稱:	附旁路風門可變風量小型室內送風機性能模擬與測試之研究
英文論文名稱:	Performance Rating and Simulation on Air-Conditioning Characteristics of Damper
指導教授:	柯明村
指導教授(英文姓名):	Ming-Tsun Ke
學位類別:	碩士
校院名稱:	國立臺北科技大學
系所名稱:	冷凍空調工程系所
學號:	93458017
學年度:	94
語文別:	中文
論文頁數:	189
關鍵詞:	附旁路風門可變風量送風機(VAV DBFCU) ; 旁路風門 ; 計算流體力學
英文關鍵詞:	Damper Bypass VAV Fan-Coil Units（VAV DBFCU）；Damper ; CFD
被引用次數:	0

[摘要]

本研究以CFD氣流模擬分析方法解析附旁路風門可變風量送風機系統內流場及溫度場分佈情形，並針對旁路風門不
之影響。此外，由於旁路風門的大小與擺設位置將直接影響回風混合均勻與否與出風溫度變化，因此有關VAV送風
究。
在數值模擬包括以三種不同的旁路風門尺寸與不同的擺設位置進行模擬解析，試圖以此方法尋找出旁路風門最佳尺
特性不僅可增加循環風量及空氣混合度，亦可藉由風門開度控制來提高出風溫度，使VAV送風機出回風溫度差降低
當室內負載穩定時，系統將調整風機維持於最低送風量，此最低送風量可使室內空氣之循環率維持在規範的最低限
產生傾瀉現象問題，並達到VAV送風機之節約能源及兼顧舒適度之目的。

[英文摘要]

This study analyzed the distribution of internal flow and temperature fields of the Damper Bypass VAV Fan-Coil U
effects of bypass damper opening to the distribution of air flow and returned air mixing as well as changes in air t
of the bypass damper and the placement position directly affect the homogeneity of returned air mixture as well a
dimension of the bypass damper of the VAV fan-coil unit and its placement position value require further study.
During the simulation analysis, including three different sizes of bypass damper and different placement positions
placement position of the bypass damper. According to the simulation results, utilizing the bypass damper not on
of air mix, but it can also raise the air temperature through the degree of damper opening, so that the VAV fan-co
characteristic as evidence by the reduced temperature differential of the returned air.
When the indoor cooling load is stable, the system will adjust the fan-coil unit to maintain minimum amount of air
indoor air circulation at the lowest standard, and is expected to resolve the dumping phenomenon produced by th
loading situation, as well as achieving the purpose of energy saving and comfort of the VAV fan-coil unit.

[論文目次]

[參考文獻]

[1] T.A. Reddy, M. Liu, D.E. Claridge, “A study of energy use and satisfactory zone ventilation of different outd
air volume systems,” Energy and Buildings, Vol. 29, 1998, pp. 65-75.

[2] S. A. Mumma, Y. P. Ke, S. P. Sevigny, “Ultrasonic Humidification：System Integration, Energy, and Indoor
Transactions, Vol. 103, Pt. 2, 1997, pp. 894-905.

[3] Y. P. Ke, S. A. Mumma, D. Stanke, “Simulation Results and Analysis of Eight Ventilation Control Strategies
Pt. 2, 1997, pp. 381-392.

[4] Y. P. Ke, S. A. Mumma, “Derivations of Equations Necessary for Primary Airflow Redistribution in VAV Sys
Ventilation Requirments,” International Journal of Heating, Ventilating, Air-Conditioning and Refrigerating Rese

[5] S. Murakami, S. Kato, J. Zeng, “Numerical Simulation of Contaminant Distribution Around a Modeled Huma
- Part II,” ASHRAE Transactions, Vol. 104, Pt. 2, 1998, pp. 226-233.

[6] J. C. William, “Indoor Air Quality：A Design Parameter,” ASHRAE Journal, Vol. 38, No. 6, 1996, pp. 39-47

[7] A. J. Baker, P. T. Williams, R. M. Kelso, “Numerical Calculation of Room Air Motion - Part 1: Math, Physics,
1, 1994, pp. 514-530.

[8] A. J. Baker, P. T. Williams, R. M. Kelso, “Numerical Calculation of Room Air Motion - Part 2: The Continuity
Dimensional Incompressible Thermal Flow,” ASHRAE Transactions, Vol. 100, No. 1, 1994, pp. 531-548.

[9] A. J. Baker, P. T. Williams, R. M. Kelso, “Numerical Calculation of Room Air Motion - Part 3: Three- Dimens
Experiment,” ASHRAE Transactions, Vol. 100, No. 1, 1994, pp. 549-564.

[10] Lam, Joseph C., Chan, Apple L.S., “CFD Analysis and Energy Simulation of a Gymnasium,” Building and

[11] M. T. Ke, “Design of Test Method and Detailed Ratings of Variable Air Volume Fan-Coil Units,” Building a

[12] 蘇啓章，可變風量技術發展與應用，碩士論文，國立台北科技大學冷凍空調工程研究所，台北，2003。

[13] 蔡旻錦，低溫差可變風量送風機性能檢測及送風特性研究，碩士論文，國立台北科技大學冷凍空調工程研究所

[14] J. Srebric, Q. Chen, L. R. Glicksman, “A Couple Airflow and Energy Simulation Program for Indoor Therma
106, Pt. 1, 2000.

[15] 楊敦盛，降低空調送風溫度對系統節能與系統效率之影響，碩士論文，國立台北科技大學冷凍空調工程研究所

[16] 謝明峰，空調低溫送風不結露擴散器之設計研究，碩士論文，國立台北科技大學電機與能源研究所，台北，1

[17] Gan, G., Awbi, H.B., “Numerical Prediction of the Age of Air In Ventilated Rooms,” Room Vent, 1997, pp

[18] S. C. Hu, J. M. Barber, Y. K. Chuah, “A study of indoor air quity for cold air distribution systems,” ASHRA

[19] Agarwal, R.K. and Bower W.W., “Navier Stokes Computations of Turbulent Compressible 2D Impinging Je

[20] Looney, M.K. and Walsh, J.J., “Mean Flow and Turbulent Characteristics of Free and Impinging Jet Flows

[21] Launder, B.E. and Spalding, D.B., “The Numerical Computation of Turbulent Flows,” Computer Methods
pp. 269-280.

[22] Launder, B.E., Prdden, C.H., and Sharna, B.I., “The Calculation of Turbulent Boundary Layers on Spinning

Vol. 99, 1997, pp. 231-239.

[23] Lin, R.S. and Chang, K.C., “Predictions of Free Jet Flow Field Using Various Turbulence Models,” J of th

[24] Yu, etc. “Three-Dimensional Calculation of Supersonic Reacting Flows Using an LU Scheme,” Sverdrup
Cleveland, Ohio, 1989.

[25] Chen, Q., “Comparison of Different Models for Indoor Airflow Computations,” Numerical Heat Transfer, F

[26] S. V. Patankar, D. B. Spalding, “A Calculation Procedure for Heat, Mass and Momentum Transfer in Three
Trans, Vol. 15, 1972, pp. 1787-1806.

[27] S. V. Patankar, “A Calculation Procedure for Two-dimensional Elliptic Situations,” Numer. Heat Transfer,

[28] Van Doormal, J. P., G. D. Rairhby, “Enhancements of the SIMPLE Method for Predicting Incompressible F
147-163.

[29] S. V. Patankar, “Numerical Heat Transfer and Fluid Flow,” HEMISPHERE PUBLISHING CORPORATIOI

[30] H. K. Versteeg and W. Malalsekera, An introduction to computational fluid dynamics The finite volume meth
Technical, New York: Wiley, 1995.