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[摘要]

本研究主要針對某國家研究中心的實驗區域進行空調氣流模擬分析，藉由實地量測空調系統作爲計算流體力學(co
最合適該中心現況之送/回風口條件與配置，預測其效益性作爲空調工程上的輔助與驗證。空調系統的優劣取決於
送風口之平均面速度有關，噴流行經之距離則與送風速度、風量、送風口面積和速度分佈形狀有關連，因此、對於
本文研究目的爲確保精密儀器設備可在恆溫恆濕之空調環境下正常操作而且能減少量測誤差，探討如何使大型空間
數值模擬分析與空調設計概念，嘗試提出符合實際現場要求之空調改善方式。研究顯示利用低溫差送風、適當的送
室內氣流溫度均勻混合，可使該實驗區域內部之室內溫度變動能控制在±0.5 ℃左右之範圍內。

[英文摘要]

This research simulates and analyzes the airflow in the experimental area of a national research center. Accordi
system, boundary conditions of computational fluid dynamics (CFD), can be deduced, and the airflow simulation
of the present space under various design cases. The air side performance is predicted to provide assists and e
air supplying system depends on the shapes and positions of the air outlets. Many researches show that in isoth
of the outlet, and the jet distance is related to the velocity, volume, the mean area of the outlet and the distributio
space focuses on the parameters of the air supplying system.
The goal of this research aims to ensure that the precision instruments in the research space air in an environme
errors due to temperature fluctuations, and discuss the environmental temperature stability in a large space unde
simulation and analysis and the concept of air-conditioning system design, a design solution is proposed that fits
The basic concept is to use raised temperature air supply (lowered the temperature difference between the spac
high air displacement rate (increasing the supply air flow rate) to take the sensible energy load away, make the a
within ±0.5 ℃.

[論文目次]

目 錄

[參考文獻]

參考文獻

[1] Cebeci, T., et al., “A General Method for Calculating Three-Dimensional Compressible Laminar and Turbule
2777, 1997.

[2] Baldwin, B.S. and Lomax, H., “Thin Layer Approximation andAlgebraic Model for Separated Turbulent Flow

[3] Agarwal, R.K. and Bower W.W., “Navier Stokes Computations of Compressible 2D Impinging Jet Flowfield
0007, 1980.

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

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

[6] Launder, B.E. and Spalding, D.B., “The Numerical Computation of Turbulent Flows,” Computer Methods i
280, 1974.

[7] Launder, B.E., Prdden, C.H., and Sharna, B.I., “The Calculation of Turbulent Boundary Layers on Spinning
Vol .99, pp. 231-239, 1997.

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

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

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

[11] “Space Air Diffusion,” ASHRAE Fundamentals Handbook, ch. 32, 2001.

[12] Suhas V. Patankar,”Numerical Heat Transfer And Fluid Flow,” HEMISPHERE PUBLISHING CORPORA

[13] H. Xing, A. Hatton, H. B. Awbi,”A Study of Air Quality in the Breathing Zone in a Room with Displacement
809-820, 2001.

[14] Joseph C. Lama, Apple L.S. Chanb. “Cfd Analysis and Energy Simulation of a Gymnasium,” Building En

[15] Juan Abanto, Daniel Barrero, Marcelo Reggio, Benoit Ozell, “Airflow Modeling in a Computer Room,” Bu

[16] David S. Dougan, and Leonard A. Damiano, “Ventilation for Acceptable Indoor Air Quality,” ASHRAE Sta

[17] “Design and Application of controls,” ASHRAE HVAC Applications, ch. 46, pp. 46.1-46.19, 2003.

[18] Qingyan Chen, Ph. D.,” Coumputational Fluid Dynamics for HVAC: Successes and Failures,” ASHRAE T

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

[20] ” Hvac Computational Fluid Dynanics,” ASHRAE Fundamentals Handbook, ch. 33, 2001.