

“Review Paper on Cfd Simulation Technique Used to Analyze the Condition of Air and Its Effect Inside A Air Conditioned Room”



Engineering

KEYWORDS: CFD, Air conditioning system, Air quality, Isothermal ceiling, Hybrid A/C system.

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ABSTRACT

With the improvement of standard of living, air-conditioning has widely been applied. However, health problems associated with air-conditioning systems and indoor air quality appear more frequently. The present paper deals with CFD study of flow and thermal characteristics in air-conditioned rooms under turbulent mixed convection conditions. Air enters room from a sidewall slot flush with isothermal ceiling and leaves through a slot in opposite wall flush with floor. The numerical simulation of air distribution in indoor space with displacement ventilation using CFD is challenging due to complexity of air diffuser geometry and the complicated air flow pattern. This paper investigates experimental and numerical study of the airflow characteristics for vortex, round and square ceiling diffusers and its effect on the thermal comfort in a ventilated room. The performance of indoor airflow for the office room with the hybrid air-conditioning system has been investigated by means of CFD analysis. The performance of indoor airflow for the office room with the hybrid air-conditioning system has been investigated by means of CFD analysis.

INTRODUCTION

Air-conditioning systems have been used in many parts of the world. The purpose of most systems is to provide thermal comfort and an acceptable indoor air quality (IAQ) for occupants. With the improvement of standard of living, occupants require more and more comfortable and healthful indoor environment [1]. Moreover indoor air requirements in industrial and health care facilities are becoming more stringent. This resulted in increasing constraints on HVAC system designers, especially when such systems have to provide the required conditions with minimum energy consumption [2]. In order to assess the performance of displacement ventilation, both experimental test and numerical simulation by computational fluid dynamics (CFD) modeling have been widely used [3]. Nowadays, the majority of people spend up to 90% of their time indoors. Knowledge and prediction of indoor climate conditions are important for optimizing indoor climate and thermal comfort, and it is also important for energy

conservation [1-4]. Indoor air quality and thermal comfort are two important aspects of indoor environmental quality that receive considerable attention [4]. Recently, hybrid ventilation, which has air-conditioning and natural ventilation, is proposed. It is important to know the airflow characteristics in the room with the hybrid ventilation to use it well. The aim of this study is to investigate the airflow characteristics in the office room with hybrid ventilation, which is influenced by the location of natural ventilation openings and outdoor air condition (wind direction, wind velocity and outdoor temperature, etc.) [5]. Recently air conditioning that combine natural ventilation with cooling (hybrid A/C system) have received increased attention. These hybrid system are considered an effective means of using natural energy and many office buildings have begun to adopt this system [6]. There are two general types of computer simulation system for studying air flow and containment transport in building- multi zone modelling and air flow modelling [7]. In the last two decades, computational fluid dynamics (CFD) has been increasing used as a prediction tool in the design and assessment of the indoor building environment. A significant number of scientific papers exist dealing with the application of CFD models in various indoor environments with considerable success, such as apartments [1], offices [2,3], clinics [4], classrooms [5], lecture theatres [6], museums [7], industrial premises [8], stadiums [9] and

airport terminals [10]. Among these buildings, large space building is a very important application objective for CFD. Large space building often has the volumes of above 10,000m³ and floor height of over 5m [8].

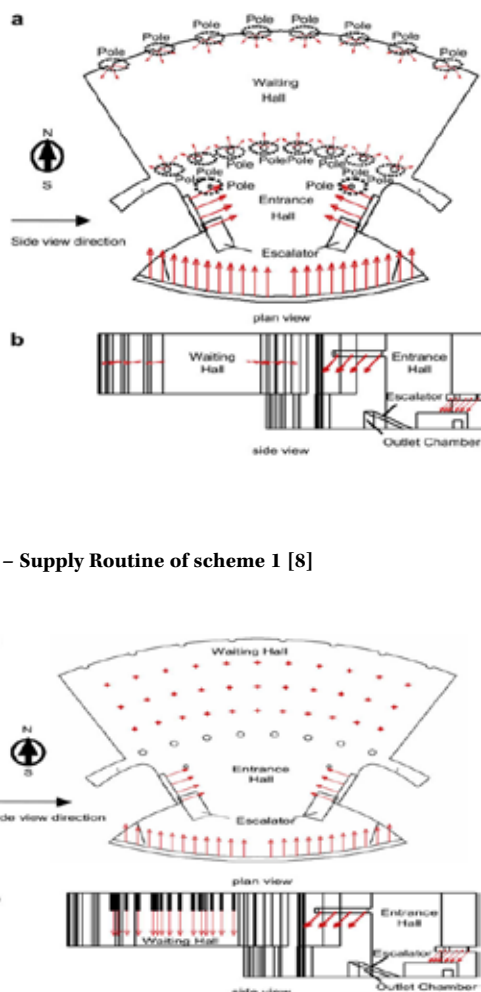


Fig 1 – Supply Routine of scheme 1 [8]

Fig 2 – Supply Routine of scheme 3 [8]**LITRETURE SURVEY**

1. Review of research on air-conditioning systems and indoor air quality control for human health by **B.F. Yu.et.al.**
2. Heat transfer characteristics in air-conditioned rooms using mixing air-distribution system under mixed convection conditions by **Sami A.et.al**
3. A simplified approach to describe complex diffusers in displacement ventilation for CFD simulations by Tengfei (Tim) Zhang.et.al
4. Experimental and Numerical Study of A/C Outlets and Its Impact on Room Airflow Characteristics by Mohammed A. Aziz.et.al
5. CFD analysis of air flow characterstics in office room with task air conditioning and natural ventilation by Eunsu Lim. et.al
6. Evaluation of indoor thermal and air enviornment in an office building using a hybrid air conditioning system based on numerical simulation by R.Yasunaga.et.al.
7. Use of computational fluid dynamics to analyze indoor air quality issue by Stefan J. Emmerich.
8. CFD study of the thermal environment in an air-conditioned train station building by Qiong Li.et.al.

CONCLUSION

By reviewing the research papers it is been concluded that CFD technique is much more better than experimental as it is less time consuming and now a days time is money. Air conditioning system have been used in many parts of the world so it is necessary to improve the condition of air conditioning system in every aspect. With the improvement in the standard of living it is necessary to provide a comfortable and healthy environment inside an air conditioned room so it is necessary to improve the indoor air quality. Knowledge and prediction of indoor climate conditions are important for optimizing indoor climate and thermal comfort, and it is also important for energy conservation so it is necessary to know about the indoor conditions. It has been also concluded that hybrid A/C system should be used for easy and comfortable environment.

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