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Abstract

NUMERICAL SIMULATION OF ATRIUM FIRE USING
TWO CFD TOOLS

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Along with the rapid development of Macao, many high rise and large space buildings have appeared. The atrium building has become a commonplace. Covered shopping malls, hotels, casinos are examples of atrium for which have large space interior. From the viewpoint of Fire Safety Engineering (FSE), the application of traditional prescriptive regulations can hardly evaluate the fire protection design of new complex structures. Gradually, a new approach, performance-based method has been developed and being applied to meet these needs in recent years. Fire simulation with performance-based code has been widely used in assessments of fire hazards due to its cost-effectiveness and versatility compared to the traditional full-scale experimental study. Moreover, it is difficult to carry out full scale burning tests in densely urban areas such as Macao. The idea of this study is to explore fire safety by using a scientific method. The research can support the emerging international movement toward performance-based approaches to building fire safety analysis and design, analysis of the level of fire protection applicable to commercial buildings. In this study, numerical simulation of fire-induced thermal and fluid flow in a large complex space has been carried out in field model with two CFD tools, STAR-CD and FDS. Results with different modeling parameters, such as computational grids, turbulence models, are

compared to quantify their relative effects. The sensitivity of the CFD results obtained by STAR-CD and FDS will be discussed.