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通风不良室内火蔓延行为的大涡模拟(PDF)

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Title: Large eddy simulation of fire spread behavior in an under-ventilated room

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关键词: 室内火灾; 通风不良; 大涡模拟; 烟气运动; 火蔓延

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摘要: 通风不良的建筑物室内发生的火灾具有很大的危害性.采用湍流大涡模拟方法,研究了通风不良室内火灾的烟气运动与火蔓延行为,得到了室内烟气温度、组分浓度、压力和速度等随时间的变化.在通风良好的条件下,计算得到的时均稳态的烟气温度与氧气浓度分布与实验相符合.在通风不良的条件下,模拟得到的烟气瞬时温度随时间的变化也与实验基本相符合,预报出了当氧气浓度消耗到较低程度时,火焰脱离壁面向通风口处移动的现象.

Abstract: Fires in an under-ventilated room pose great hazard.Large eddy simulation was utilized presently to investigate the smoke motion and fire spread in an under-ventilated room.The instantaneous variations of the smoke temperature,species concentration,pressure,and velocity with time were obtained.The calculated distributions of the time-averaged steady temperature and oxygen concentration of the smoke in the well-ventilated room agree with the measured test data.The simulated temperature evolution of the smoke in the unde-rventilated room is in general agreement with the test data.The movement of the flame from the wall to the open slot is correctly predicted when the oxygen concentration in the room falls down to a low level.

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