

李磊,吴迪,张立杰,袁磊.基于数值模拟的城市街区详细规划通风评估研究[J].环境科学学报,2012,32(4):946-953

基于数值模拟的城市街区详细规划通风评估研究

Ventilation assessment on urban-block detailed planning based on numerical simulation

关键词: [城市详细规划](#) [通风评估](#) [数值模拟](#) [风洞实验](#)

基金项目: [国家自然科学基金\(No.40805004\)](#); [城市气象科学基金\(No.UMRF200901\)](#); [深圳市科技研发资金基础研究计划项目\(No.201006020747A\)](#)

作者 单位

李磊 1. 中国气象局北京城市气象研究所,北京 100089;

2. 深圳市国家气候观象台,深圳市气象局,深圳 518040

吴迪 深圳市国家气候观象台,深圳市气象局,深圳 518040

张立杰 深圳市国家气候观象台,深圳市气象局,深圳 518040

袁磊 深圳大学建筑及城市规划学院,深圳 518060

摘要: 高密度城市建筑会导致城市街区内部风速降低并加剧空气污染,因此对城市详细规划进行通风评估十分必要.由于数值模拟具有经济简便的优势,因此以USSM模式为工具,对城市街区详细规划通风评估方法进行了研究.利用汉堡大学CEDVAL风洞实验数据集对USSM模式的准确性进行了验证,表明USSM模式可以较准确地描述建筑对近地层风场的影响.通过36组敏感性数值试验,研究了建筑密度、排列方式和楼高高低错落对街区通风条件的影响,在此基础上得到了一系列关于通风条件优化的详细规划策略,包括:1对于建筑密度较高的街区,应该依主导风向预留通风道;2相同容积率条件下,分散的建筑布局比集中连片的建筑布局更有利于获得通风条件;3略有错落的建筑布局对于获取更好的通风条件有较大帮助;4较矮的建筑物应布设在上风向,而较高的建筑应布设在下风向.最后,以深圳前海地区详细规划方案为例进行了实际案例评价分析,证明即使街区内的容积率不变,按照一定原则对方案进行调整,仍可在一定程度上改善街区内的通风条件.上述研究表明,以数值模式为工具进行城市街区详细规划的通风评估,是提高城市街区通风能力的一种经济简便易行的方法,适合在我国内地各城市推广.

Abstract: High-density urban construction lowers wind speed and consequently exacerbates air pollution within city block, therefore the ventilation assessment on urban-block detailed planning is necessary. The assessment was performed in this study by using Urban Sub-domain Scale Model (USSM). The accuracy of USSM model was validated by using the CEDVAL wind tunnel dataset from the University of Hamburg, which shows that the USSM model can accurately describe the impact of the building on the wind field near ground. Based on 36 sensitive numerical tests, the impacts of the buildings' density, the layout of the buildings and the height distribution of the buildings on the ventilation condition were analyzed. A series of optimized ventilation oriented strategies were concluded for urban-block detailed planning. These strategies include: 1 for urban area with high density constructions, the ventilation corridor should be reserved following prevailing wind direction; 2 for a particular volume rate, a block with a scattered building distribution can obtain better ventilation capability than that with a concentrated one; 3 appropriate irregularity of buildings layout will help to get better ventilation; and 4 the lower buildings should be constructed in the windward side, while the higher ones in the downwind side. Finally, taking the Houhai area of Shenzhen as an example, an actual ventilation assessment on urban-block detailed planning was performed, which shows that even if the volume rate keeps unchanged, the ventilation capability of the urban block can still be improved to a certain degree through the modifications on the planning according to certain principles. The study indicates that ventilation assessment on urban-block detailed planning based on numerical simulation is an economic and convenient way to improve the ventilation condition of urban block, and is worthy to be recommended in cities of mainland China.

Key words: [urban-block detailed planning](#) [ventilation assessment](#) [numerical simulation](#) [wind tunnel experiments](#)

摘要点击次数: 600 全文下载次数: 461

关闭

下载PDF阅读器

您是第**3567783**位访问者

主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

本系统由北京勤云科技发展有限公司设计