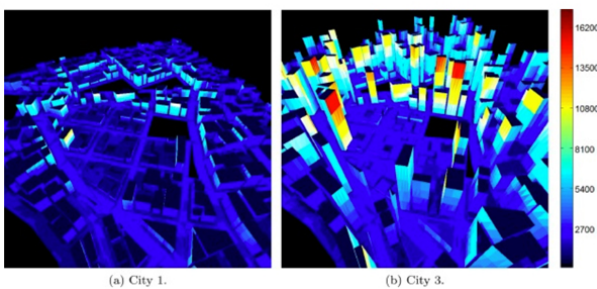


Computing Urban Radiation: A Sparse Matrix Approach

Aguerre, Jose Pedro; Fernandez, Eduardo; Besuievsky, Gonzalo; Beckers, Benoit



Cities numerical simulation including physical phenomena generates highly complex computational challenges. In this paper, we focus on the radiation exchange simulation on an urban scale, considering different types of cities. Observing that the matrix representing the view factors between buildings is sparse, we propose a new numerical model for radiation computation. This solution is based on the radiosity method. We show that the radiosity matrix associated with models composed of up to 140k patches can be stored in main memory, providing a promising avenue for further research. Moreover, a new technique is

proposed for estimating the inverse of the radiosity matrix, accelerating the computation of radiation exchange. These techniques could help to consider the characteristics of the environment in building design, as well as assessing in the definition of city regulations related to urban construction.