Urban vs. Rural climates and their impacts on the urban building design energy assessment

Urban Morphology in the Age of Artificial Intelligence

Book of Abstracts

ISUF | Torino | 2025

17th - 20th June

XXXII - International Seminar on Urban Form

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Urban vs. Rural climates and their impacts on the urban building design energy assessment

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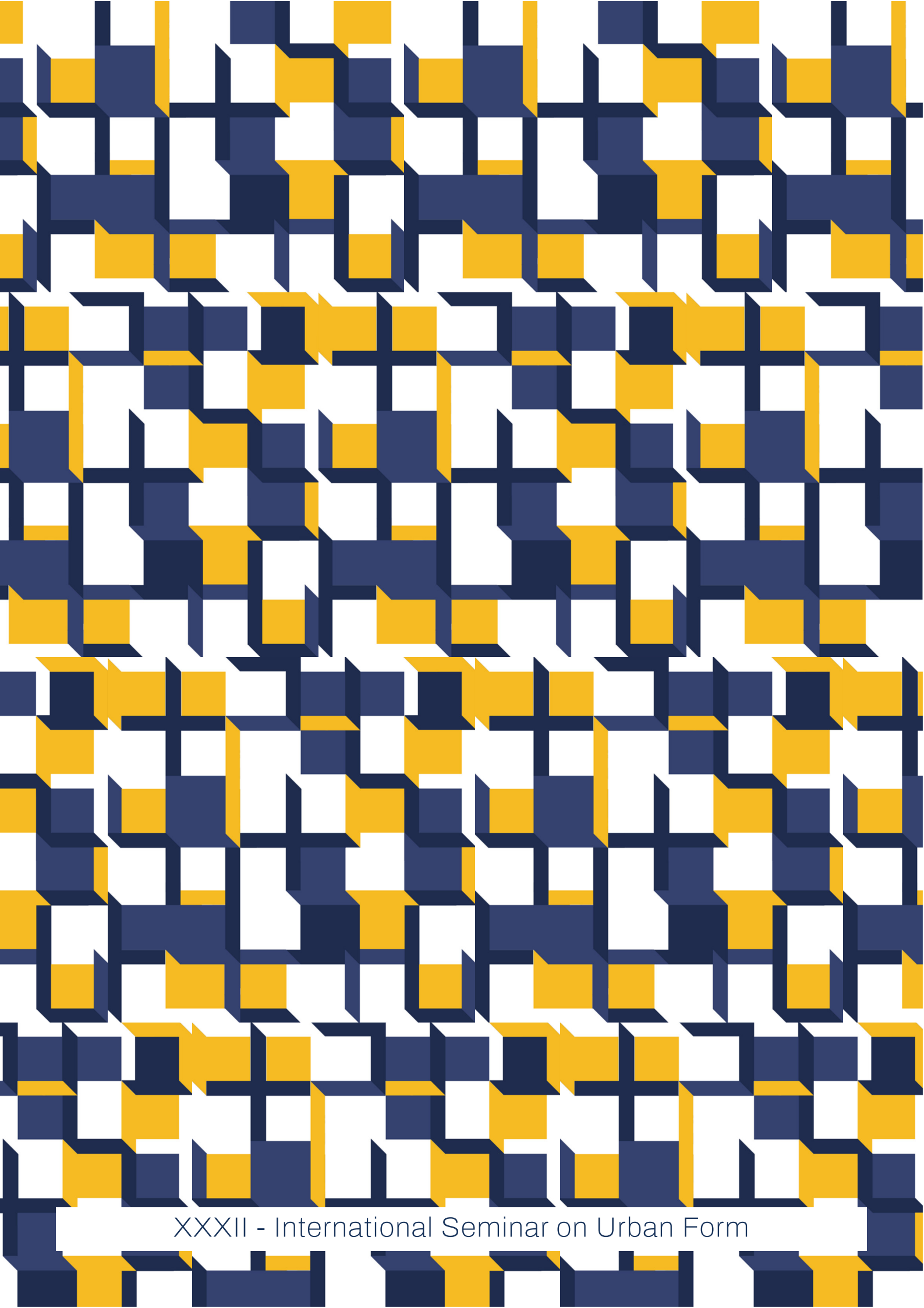
Designing the built environment at different scales generally requires integrating devoted analyses to verify and optimise design choices' behaviours and performances. Based on the energy and comfort point of view, simulation tools, such as Energy Plus, typically combine design inputs with the local climatic conditions. Nevertheless, in building simulations, using standard typical weather files derived from airport data, such as almost all the available data, is a common approach, often neglecting the distinctions between urban and rural environments. This practice can lead to inaccurate simulations, impacting design decisions and policy recommendations. While phenomena like the urban heat island (UHI) and urban dry island (UDI) are widely recognised, many simulations still rely on rural weather data for all buildings within a city and its suburbs. This study addresses this issue by exploring the use of tools that adjust weather data to reflect urban conditions. Specifically, the Urban Weather Generator (UWG) is employed to assess the sensitivity of weather data based on varying urban morphologies within the city of Torino. The study focuses on the mapping and transformation of the case study to incorporate urban climate data, providing a more accurate representation for designers and professionals. To ensure consistency, typical key performance indicators (KPIs) are applied for different scales, generally require integrating devoted analyses of urban morphologies, including the use of energy certification tools, such as Termolog, and a comparison is made between simulations using morphed urban weather files, original rural weather files, and the local official ones released within the energy and building correlated standards (e.g. UNI 10349). This approach aims to refine building simulations, offering more reliable urban design and planning insights.



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