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Incorporating Geography Altered Breeze Streams into Primary and Ecological Breeze Designing Applications

Mohsen Heshmati*

Department of Civil and Environmental Engineering, University of University of Technology, Gothenburg, Sweden

Abstract

This study uses a series of wind tunnel tests and CFD simulations. It has been discovered that pedestrian-level wind environments with large low-wind areas are produced by wind flows with yaw angles. These outcomes can be recreated utilizing regular breeze streams with an original strategy called the same breeze rate point technique. Wind streams with little certain pitch points misrepresent the relocations and wind loadings of designs, while negative pitch points are worthwhile for the streamlined exhibition of designs. The differential underlying optimal design exhibitions are owing to contrasts in downwash and up wash streams, and shape of the shear layers at the top and lower part of a construction exposed to twist streams with positive and negative pitch points. The yaw and pitch angles of wind are caused by topographical features, which alter the wind's trajectory in both the horizontal and vertical planes. Close to mountains, geography actuated pitch and yaw points are restricted to the lower a piece of the climatic limit layer and have impressive extents, in this way they ought to be thought about in wind designing applications. In order to learn how wind flows with pitch and yaw angles affect the wind loading of structures and the wind environment in built-up areas.

Keywords: Climatic limit • Ecological breeze • Geography

Introduction

Geography, with its diverse and unique features, plays a crucial role in shaping our environment. Engineers and designers have increasingly recognized the significance of incorporating geography into their projects to optimize functionality, sustainability, and aesthetics. By harnessing the power of natural features, such as landforms, water bodies, and vegetation, we can create innovative solutions that harmoniously integrate with the surrounding environment. In this article, we will explore the benefits and applications of incorporating geography into engineering and design practices. Incorporating geography into site planning allows engineers and architects to optimize the use of natural resources and minimize environmental impacts. By studying the topography, soil conditions, and hydrological patterns of a site, professionals can design structures that seamlessly integrate with the landscape.

Literature Review

This approach reduces the need for extensive earthworks and helps preserve valuable ecosystems, ultimately promoting sustainable development. Water bodies, such as rivers, lakes, and wetlands, are integral components of our geographical landscape. By understanding the hydrological dynamics and incorporating them into engineering designs, we can implement effective water management strategies. This may include utilizing natural water retention features, designing sustainable drainage systems, or implementing green infrastructure solutions that mimic natural water flows. Incorporating geography in water management not only conserves this vital resource but also mitigates the risks associated with flooding and water pollution. Geography greatly influences local climate patterns, including temperature, wind direction, and solar exposure [1].

***Address for Correspondence:** Mohsen Heshmati, Department of Civil and Environmental Engineering, University of University of Technology, Gothenburg, Sweden, E-mail: heshmati@gmail.com*

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By considering these factors during the design process, architects can create buildings that are responsive to their specific climate. For instance, incorporating shading structures to reduce heat gain, orienting buildings to optimize natural ventilation, or utilizing passive solar design principles can enhance energy efficiency and occupant comfort. By working in harmony with the natural climate, we can reduce reliance on mechanical systems and decrease the ecological footprint of buildings. The field of wind engineering has seen significant advancements in recent years, with researchers and engineers exploring innovative approaches to harness the power of wind for various applications. One such area of exploration involves incorporating altered breeze streams into primary and ecological wind engineering practices. By understanding the intricacies of local geography and manipulating wind patterns, we can unlock new possibilities for sustainable energy generation, climate control, and architectural design. In this article, we will delve into the concept of altered breeze streams and their potential applications in primary and ecological wind engineering [2].

Discussion

Altered breeze streams refer to the manipulation or redirection of wind patterns through modifications in local geography. The natural topography, such as hills, valleys, and bodies of water, can influence the flow and direction of wind. By strategically altering these geographic features, engineers can create localized changes in wind patterns, leading to a range of benefits. One significant application of altered breeze streams lies in sustainable energy generation. Wind turbines and wind farms are traditionally placed in locations with high and consistent wind speeds. However, altering the local geography can help optimize wind resources in areas that may not have naturally high wind speeds. By strategically redirecting wind patterns through the installation of windbreaks, deflection structures, or terrain modifications, engineers can increase wind flow and maximize energy production, even in areas that were previously considered unsuitable for wind power. Altered breeze streams can also be leveraged for climate control and ventilation purposes [3,4].

By understanding the prevailing wind patterns in a particular region, architects and urban planners can design buildings and cities to capitalize on natural ventilation. Incorporating wind channels, courtyards, and landscaping features can facilitate the flow of breeze streams, promoting air circulation, reducing the need for mechanical cooling systems, and enhancing indoor comfort. This approach can contribute to energy efficiency and create more sustainable and livable environments. Urban areas often experience the phenomenon known as the urban heat island effect, where the concentration of buildings and paved surfaces leads to increased temperatures compared to surrounding rural areas. Altered breeze streams can aid in mitigating this effect by introducing natural cooling mechanisms. By strategically guiding wind flow through urban spaces, engineers and planners can enhance the dispersion of heat and pollutants, improving air quality and reducing the overall temperature of urban areas. Incorporating altered breeze streams into ecological wind engineering can have positive impacts on biodiversity and ecosystem health. By creating wind corridors and green spaces, engineers can facilitate the dispersal of seeds, promote pollination, and enhance habitat connectivity for wildlife. This approach supports the restoration and conservation of ecosystems, contributing to the overall ecological balance and resilience of a region [5,6].

Conclusion

The concept of altered breeze streams presents exciting opportunities for primary and ecological wind engineering applications. By understanding the local geography and manipulating wind patterns, we can unlock the potential of wind energy generation, optimize climate control, mitigate the urban heat island effect, and enhance ecological design. Embracing these approaches in wind engineering will pave the way for sustainable and environmentally conscious practices, creating a harmonious interaction between human activities and the natural environment.

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Conflict of Interest

No potential conflict of interest was reported by the authors.

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