

Architectural Engineering Technology

Keywords:

Introduction

The architectural engineering field is a multidisciplinary approach that combines the principles of architecture, engineering, and technology to create sustainable and functional built environments. This field focuses on the integration of various systems, including structural, mechanical, electrical, and plumbing, to ensure the overall performance and safety of a building. The primary goal is to optimize the design and construction process, resulting in cost-effective and high-quality structures that meet the needs of the occupants and the environment.

One of the key challenges in architectural engineering is the coordination of different disciplines during the design and construction phases. This requires a strong communication and collaboration among architects, engineers, and other professionals involved in the project. The use of Building Information Modeling (BIM) has emerged as a powerful tool to facilitate this coordination, allowing for the creation of a digital representation of the building and its systems. BIM enables the visualization and simulation of the building's performance, helping to identify potential issues and optimize the design before construction begins.

Another important aspect of architectural engineering is the focus on sustainability and energy efficiency. This involves the use of green building practices, such as passive design, renewable energy sources, and energy-efficient materials and systems. The goal is to reduce the building's carbon footprint and improve its overall environmental performance. This is achieved through a combination of design strategies and the use of advanced technologies, such as smart building systems and energy management systems.

In conclusion, architectural engineering is a rapidly growing field that plays a crucial role in the development of sustainable and functional built environments. The integration of architecture, engineering, and technology is essential for creating high-quality buildings that meet the needs of the future. As the field continues to evolve, it is expected that the use of advanced technologies and sustainable practices will become increasingly prevalent, leading to more efficient and resilient buildings.

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Discussion

Wind velocity distribution



Figure 3: Mean monthly wind velocity for Safawi.

Figure 4: Mean monthly wind velocity for Azraq south.



Figure 5: Repeated hours for wind velocities of Daba'a site.



Figure 6: Repeated hours for wind velocities of Safawi site.



Figure 7: Repeated hours for wind velocities of Azraq south site.

The Weibull prediction model is used to predict the failure probability of a component under a given stress level. The model is defined as follows:

Weibull prediction model

The Weibull prediction model is used to predict the failure probability of a component under a given stress level. The model is defined as follows:

$$P_v = \frac{k}{c} \left(\frac{V}{c} \right)^{k-1} \exp \left[- \left(\frac{V}{c} \right)^k \right] \quad (1)$$

$$\frac{dP_v}{dV} = \frac{k}{c} \left(\frac{V}{c} \right)^{k-2} \exp \left[- \left(\frac{V}{c} \right)^k \right] \left[1 - \left(\frac{V}{c} \right)^k \right] \quad (2)$$

$$c = \frac{\bar{V}}{\Gamma[1+k/k]} \quad (3)$$

$$\bar{V} = \int_0^{\infty} V f(V) dV = \int_0^{\infty} V \frac{k}{c} \left(\frac{V}{c} \right)^{k-2} \exp \left[- \left(\frac{V}{c} \right)^k \right] \left[1 - \left(\frac{V}{c} \right)^k \right] dV \quad (4)$$

$$k = \frac{1}{\bar{V}} \int_0^{\infty} V^2 f(V) dV - \bar{V} \quad (5)$$

$$V_r = \left\{ \left[Lam \left(\frac{3\alpha}{k} \right)^{k-3} \right] / k \right\}^{\frac{1}{k}} C \quad (1)$$

$$\alpha = \exp \left\{ \left[- \left(\frac{V_o}{c} \right)^k \right]^{k-3} / k \right\} \quad (2)$$

Substituting equation (2) into equation (1) and simplifying, we get the following equation:

$$V_r = \left\{ \left[Lam \left(\frac{3 \exp \left\{ \left[- \left(\frac{V_o}{c} \right)^k \right]^{k-3} / k \right\}}{k} \right)^{k-3} \right] / k \right\}^{\frac{1}{k}} C \quad (3)$$

Equation (3) is the final equation for the velocity of the fluid flow.

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