

Dedication

In Memory of my mother

And

In Love of my Father

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Abstract

This research is concerned with the study of the effect of wind load on tall buildings. In the study the wind load is dealt with since it is more likely to take place in Sudan and affect tall buildings. The importance of carrying out nonlinear $p-\Delta$ and $p-\Delta-w-l$ as compared to linear static analysis is studied

A twenty story building is analyzed linearly and nonlinearly for wind loads via the commercial software ETABS v13. The linear results are then presented graphically against results of a previous study of a similar building for the comparison so as to check the accuracy of the model. Also nonlinear analysis using $p-\Delta$ And $p-\Delta$ With large displacement methods and linear results are compared with each other. The results wear compared for displacement and shear.

On bases of these recommendations on the analysis type necessary for tall building subjected to wind loads are drawn. The results shown that the use of the $p-\Delta$ with large displacement analysis is important it the correct displacement and shear force are to be obtained

مستخلص

يهتم هذا البحث بدراسة أثر أحمال الرياح عن طريق التحليل اللا خطي علي المباني العالية. في هذه الدراسة تم التعامل مع أحمال الرياح فقط لان لها نسبه احتمال حدوث اكبر في السودان مقارنة بالكوارث الأخرى. ويهتم هذا البحث بدراسة اهمية إجراء التحليل اللا خطي بطريقة (P. Δ & (P. Δ with large مقارنة بالتحليل الخطي.

تمت دراسة مبني مكون من عشرين طابقاً وتم تحليل هذا المبني بواسطة برنامج التصميم ETABSv13 تحت تأثير القوي الأفقية للرياح وتم التحليل بالطريقتين وتمت مقارنة نتائج التحليل الخطي مع نتائج دراسة سابقة لمبني مماثل وذلك بغرض إختبار دقة النموذج وتمت مقارنة التحليل الخطي مع التحليلين اللا خطيين بواسطة (P. Δ) (P. Δ w large). وعرضت هذه النتائج في شكل مخططات توضح اثر حمولات الرياح بالنسبة للإزاحة وقوة القص.

وعلي ضوء هذه المقارنة تم وضع مقترحات عن نوع التحليل المناسب للمباني العالية المعرضة لأحمال الرياح. وقد اظهرت النتائج ضرورة إستخدام التحليل اللا خطي (P. Δ) للحصول علي الازاحات وقوة القص الصحيحة.

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LIST OF SYMBOLS:

g stander deviation

G gust factor

g_p peak factor

ω_n fundamental natural frequency

r roughness factor

B excitation due to the ground turbulence

R excitation by the turbulence resonant with structure

β damping ratio

F frequency

a_D maximum acceleration

Δ maximum wind induced deflection at the top of the building

V_{ob} shear

P average density of the building

P design pressure

q Velocity pressure

W total load

M mass matrix

U displacement vector

K_z	The velocity pressure exposure coefficient..
K_{zt}	Topographic factor as input by the user.
K_d	Directionality factor as input by the user.
V	Basic wind speed in miles per hour (mph) as input by the user
I	Importance factor as input by the user.
z	Distance (height) from input bottom story