

Discussion

A method for static and dynamic analyses of stiffened multi-bay coupled shear walls*

Discussion by Hikmet Hüseyin Çatal†

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Abstract. The aim of this discussion is to expose incorrect formulations and terms in the aforementioned paper.

Keywords: multi-bay coupled shear walls; lateral forces.

1. Introduction

The behavior of coupled shear walls under the lateral forces was idealized as a sandwich beam by the authors. However, it is necessary for this analysis to make addition assumptions. Furthermore, in Eqs. (1), (5), (6) and (7) of the author's paper are not correct. I wish to make the following comments on the author's paper.

2. Comments

- 1) The authors must be present assumptions for this analysis below as in the following:
 1. The cross-sections of the members are constant.
 2. The axes of the members are linear.
 3. The heights of storey are regular.
- 2) The authors mentioned in the section 2.1 that under the lateral forces acting on the storey levels are considered equation of coupled shear wall of the i th storey can be written as

$$EI_i \frac{d^4 y_i}{dz_i^4} - GA_i \frac{d^2 y_i}{dz_i^2} + GA \frac{d\psi_i}{dz_i} = 0$$

The above equation is derived incorrectly in the paper because the lateral forces are omitted by the authors. The mathematical model of equivalent sandwich beam should be as (Fig. 1)

Eq. (1) of the paper should be rewritten as

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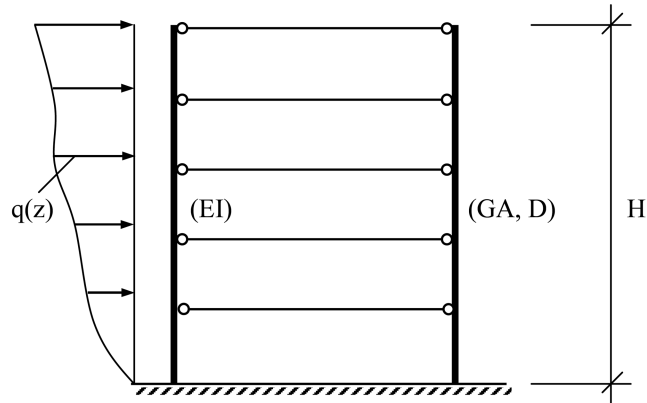


Fig. 1 Mathematical model of equivalent sandwich beam

$$EI_i \frac{d^4 y_i}{dz_i^4} - GA_i \frac{d^2 y_i}{dz_i^2} + GA \frac{d\psi_i}{dz_i} = q(z) \quad (1)$$

Where, $q(z)$ is the lateral force function, H is the height of the structure. Thus, Eqs. (5), (6) and (7) of the paper which are derived by using Eq. (1) of the paper are not correct (Swaddiwudiphong *et al.* 2001, Zalka 2007).

References

- Swaddiwudiphong, S., Lii, L.L. and Zhou, Q. (2001), "Effect of axial on vibration of tall buildings", *Struct. Des. Tall Build.*, **10**, 79-91.
- Zalka, K.A. (2007). "A simple method for the deflection analysis of tall wall-frame building structures under horizontal load", *Struct. Des. Tall Special Build.*, DOI:10.1002/tal.410.

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The author thanks to discusser for his comments. But his comments are not acceptable for the reasons that are presented below:

- 1) There is not an assumption that the cross sections of the elements are constant, they may change. Transfer matrix method provides the change of the cross sections.
- 2) The heights of storey are not regular, they may change.
- 3) It is very clear that the lateral forces are not omitted. They are considered as acting on the storey levels, not distributed (Fig. 1). In the first sentence of Section 2.1 which is titled as “Storey transfer matrices” this assumption is expressed. Thus, Eqs. (1), (5), (6) and (7) are correct. It is clear that if the lateral forces were omitted the internal forces were zero.

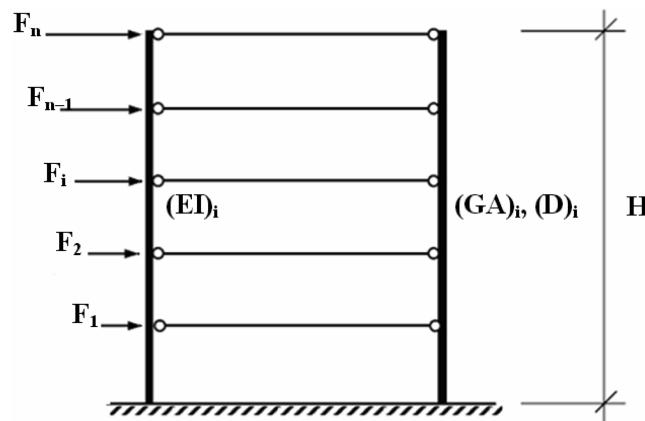


Fig. 1 Physical model of equivalent sandwich beam