REINFORCED CONCRETE DESIGN 1

Design of Column

by
Dr. Sharifah Maszura Syed Mohsin
Faculty of Civil Engineering and Earth Resources
maszura@ump.edu.my

Lesson Outcome

At the end of this topic, students should be able to:

- Identify types of column
- Define and explain column loading
- Define and calculate axial column loading
- Design typical simple column
- Illustrate simple column detailing

Introduction

- Columns in a structure carry the loads from beams and slabs down to the foundations.
- They are primarily compression members that have to cater axial loads and also to resist bending forces due to the continuity of the structure.
- Design of columns is governed by the ultimate limit state; deflections and cracking during service conditions.

Columns classification

Columns can be classified into:-

1. Braced and Unbraced Column
2. Slender and Non-slender Column

Braced & Unbraced Column

- Braced column (consider only axial force)
  where the lateral loads are resisted by shear walls or other forms of bracing capable of transmitting all horizontal loadings to the foundation.
- Unbraced column (consider both axial and horizontal forces)
  where horizontal loads are resisted by the frame action of rigidly connected columns, beams and slabs.

Column design

Column design involves the consideration of this following aspects:

- Slenderness ratio, λ
- Slenderness limit, λ_{lim}
- First order effects
- Second order moments
- Reinforcement details

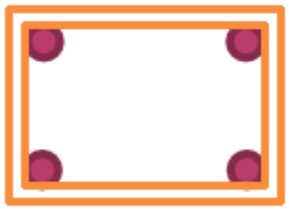
Classification of column

- In the design of braced columns, it can be classified into short and slender column.
- If $\lambda \leq \lambda_{lim}$ => short column where second order moments (effects) can be ignored
- If $\lambda > \lambda_{lim}$ => slender column

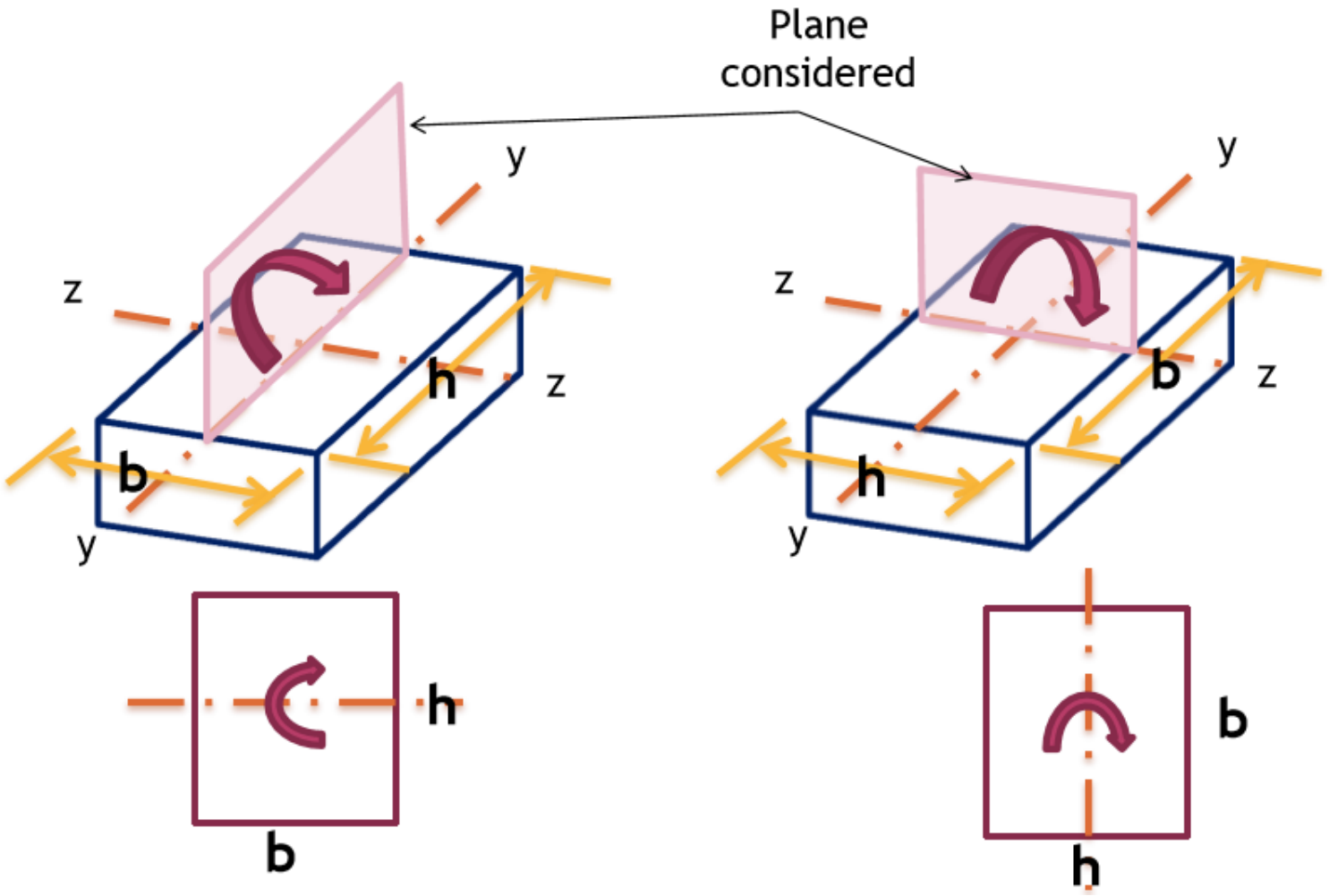
In this syllabus, only short column will be discussed

Arrangement of reinforcement

- For rectangular column: provide at least 4 bars with $\phi_{bar} \geq 12$ mm.
- For circular column: provide at least 6 bars $\phi_{bar} \geq 12$ mm



Determination of h value



Determination of h value

- When the column bends about major axis (z) - h is the longer dimension
- When column bends about minor axis (y) - h is the shorter dimension

Examples and Tutorials