

lecture
 nine



pinned frames,
 hinged arches

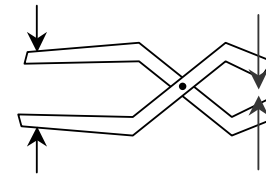
Pinned Frames 1
 Lecture 9

Architectural Structures I
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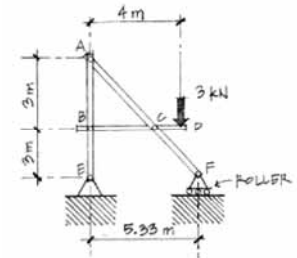
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Pinned Frames

- structures with at least one 3 force body
- connected with pins
- reactions are equal and opposite
 - non-rigid
 - rigid



Pinned Frames 4

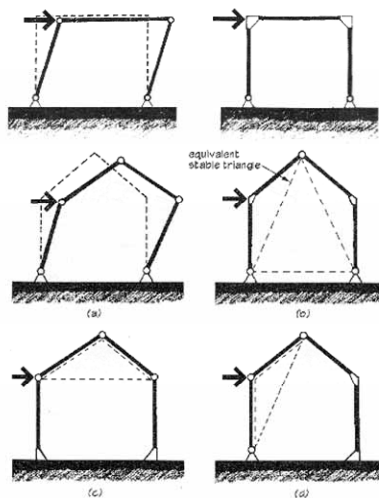


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Rigid Frames

- rigid frames have no pins
- frame is all one body
- typically statically indeterminate
- types
 - portal
 - gable



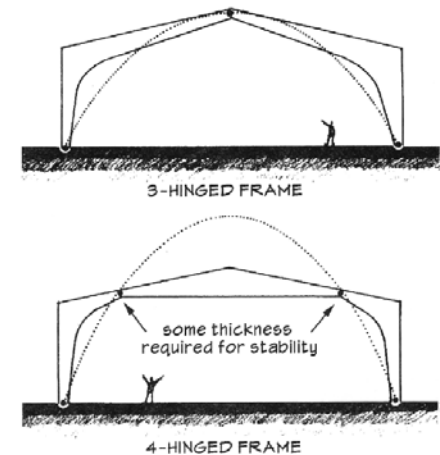
Pinned Frames 5

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Rigid Frames with PINS

- frame pieces with connecting pins
- not necessarily symmetrical



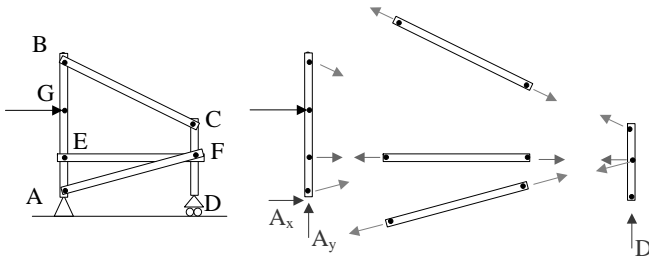
Pinned Frames 6

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Internal Pin Connections

- *statically determinant*
 - 3 equations per body
 - 2 reactions per pin + support forces



Pinned Frames 7

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Arches

- *ancient*
- *traditional shape to span long distances*



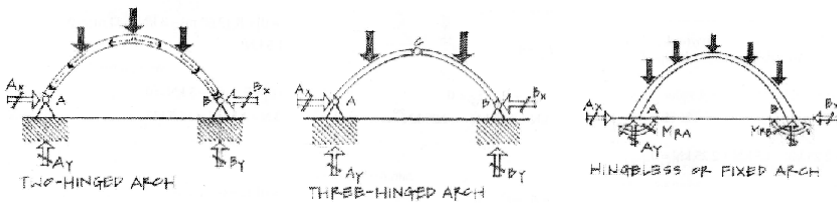
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Arches

- *primarily sees compression*
- *a brick "likes an arch"*



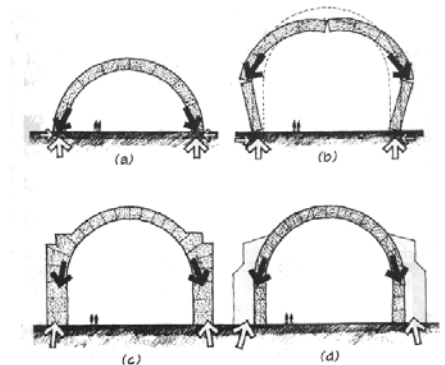
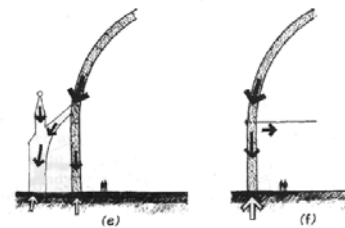
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Arches

- *behavior*
 - *thrust related to height to width*



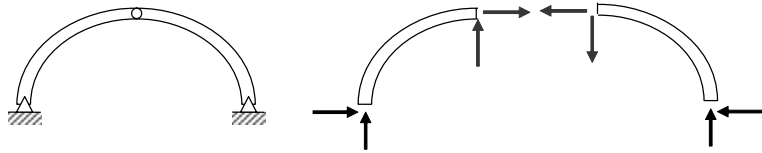
Pinned Frames 10

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Three-Hinged Arch

- *statically determinant*
 - 2 bodies, 6 equilibrium equations
 - 4 support, 2 pin reactions (=6)



Pinned Frames 11

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Procedure

- *solve for all support forces you can*
- *draw a FBD of each member*
 - *pins are integral with member*
 - *pins with loads should belong to 3+ force bodies*
 - *pin forces are equal and opposite on connecting bodies*
 - *identify 2 force bodies vs. 3+ force bodies*
 - *use all equilibrium equations*

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