Teoria das Estruturas I - Aula 04



Diagramas de Estado de Pórticos Planos Isostáticos Via Equações

- Definição de Pórticos e Regras para Traçado de Diagramas em Pórticos

Prof. Juliano J. Scremin

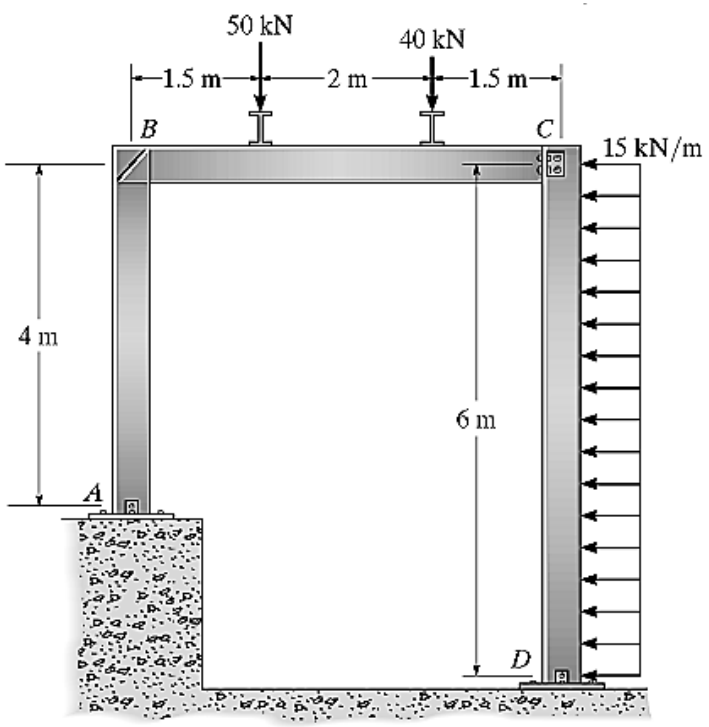
Universidade POSITIVO

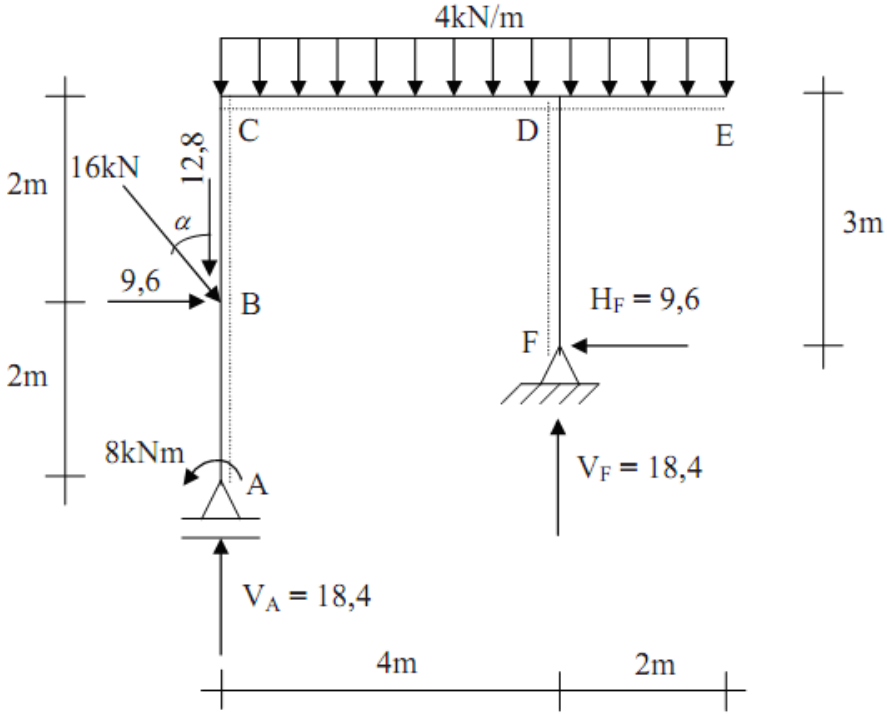
Aula 04 - Seção 01:
Definição de Pórticos e Regras para Traçado de Diagramas em Pórticos

Pórticos

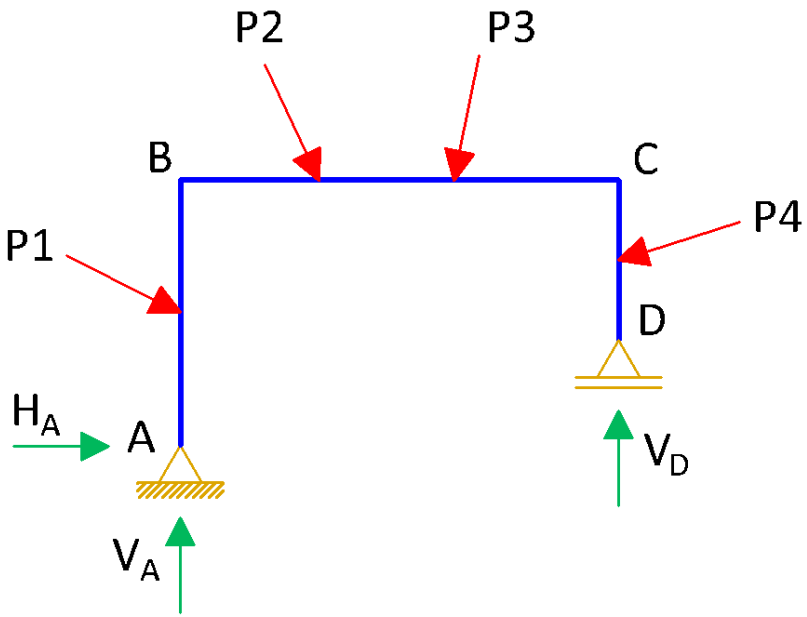
- Pórticos são **estruturas reticuladas formadas por barras não alinhadas**.
- Os pórticos planos possuem as **barras e as forças** (ações e reações) **situados todos no mesmo plano**.
  - Em termos práticos, a nível de determinação de esforços internos, os pórticos não passam de **associações de vigas** com variadas direções conectadas por diferentes tipos de vínculos internos.
  - Assim sendo, todo o procedimento utilizado na determinação de esforços internos em vigas pode ser empregado nos pórticos com a ressalva do acréscimo dos diagramas de esforços axiais (antes não analisados).

Exemplos de Pórticos



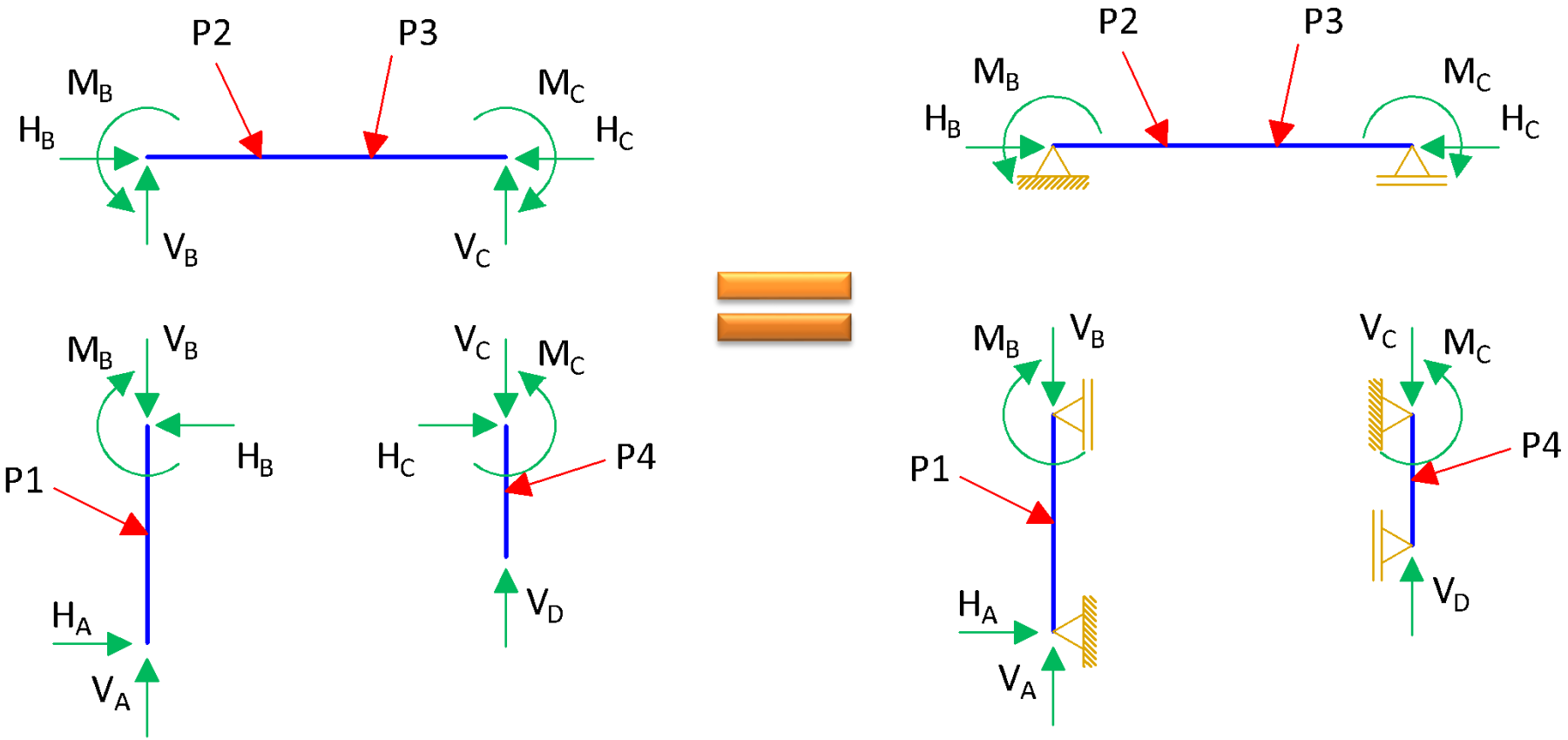


Divisão de Pórtico em Vigas (1)



- Sejam o pórtico isostático ao lado, definido pelos pontos **ABCD** e carregado pelas cargas **P1, P2, P3** e **P4**.
- A determinação de seus **esforços internos** pode ser feita considerando-o como sendo composto por **3 vigas (AB, BC, CD)** cujas **reações de apoio nas extremidades** transmitem-se como **cargas para as vigas adjacentes**.

Divisão de Pórtico em Vigas (2)

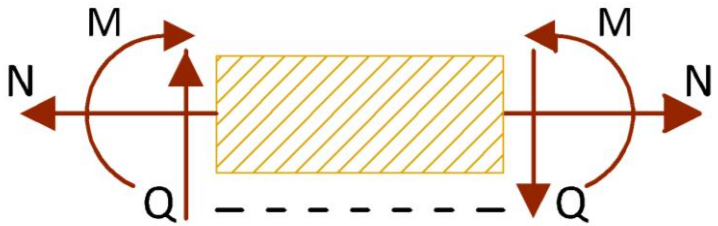


Traçado de Diagramas

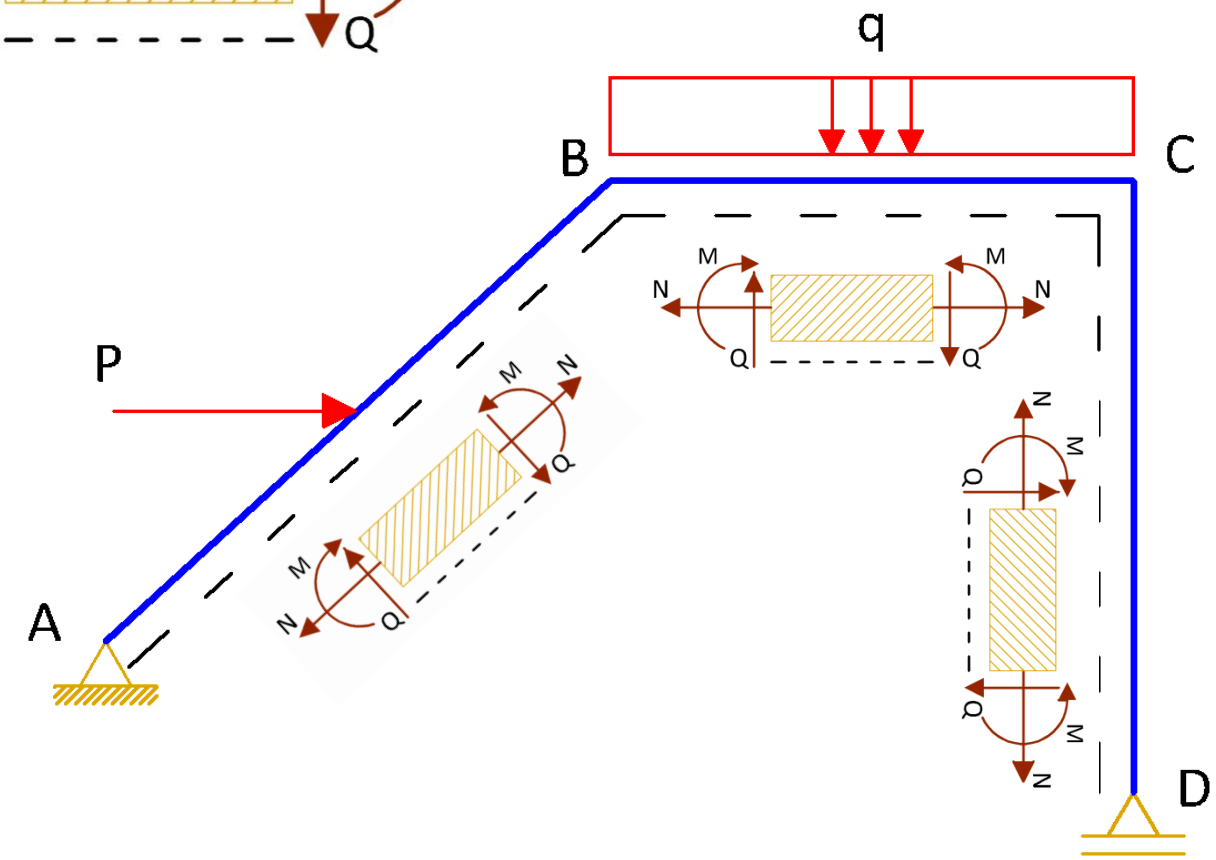
- Logo, para traçar o diagrama de momentos fletores atuantes em um pórtico, basta ser feita a **marcação dos momentos atuantes nos seus nós** **(extremidades das barras),** ligá-los por uma reta tracejada **(linha de fechamento)** e **pendurar** nessa linha **os diagramas de vigas básicas** com o mesmo carregamento atuante em cada viga componente do pórtico.

- Processo semelhante pode ser utilizado para os diagramas de esforço cortante e esforço normal.

Convenção de Sinais (1)

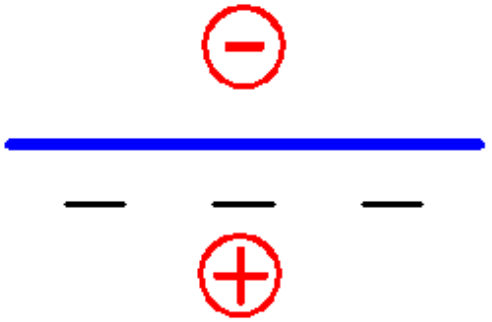


- Manter os pontilhados alinhados

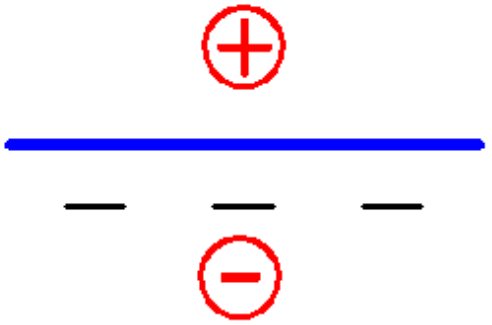


Convenção de Sinais (2)

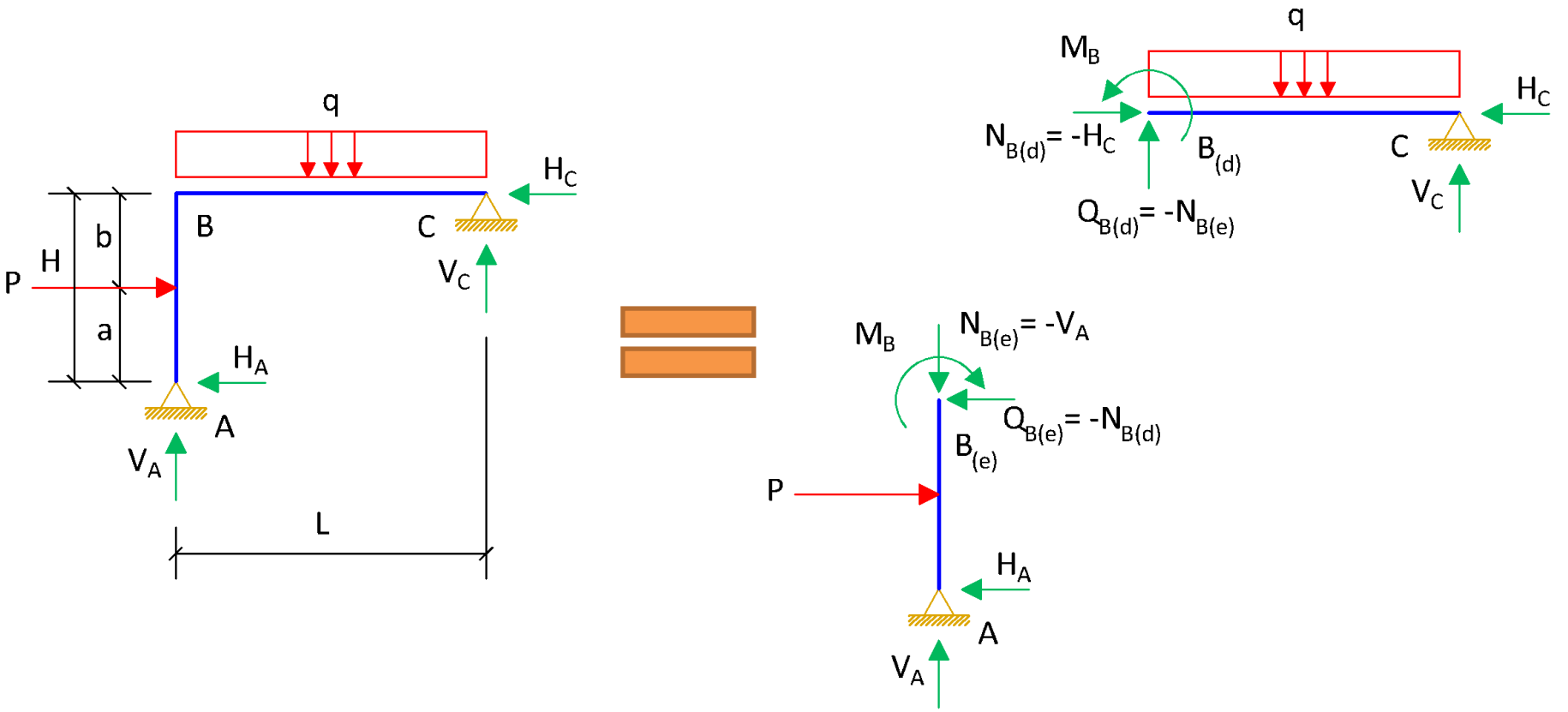
- **Momentos Fletores:**
  - Sinal positivo (+) para o lado do tracejado
  - Sinal negativo (-) no lado oposto ao tracejado



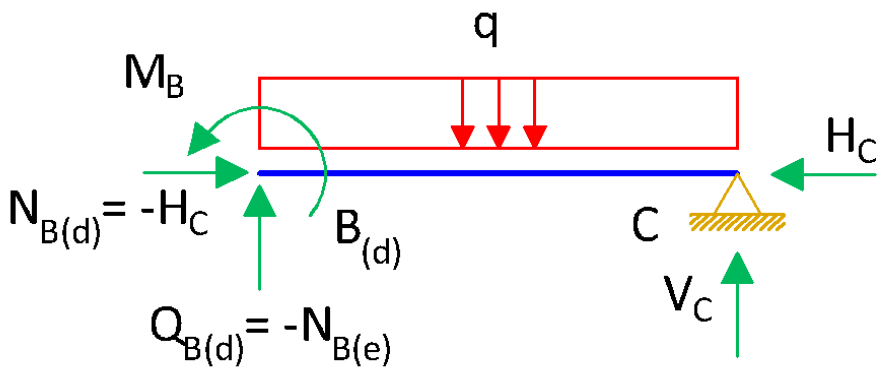
- **Esforços Cortantes e Axiais**
  - Sinal negativo (-) para o lado do tracejado
  - Sinal positivo (+) no lado oposto ao tracejado

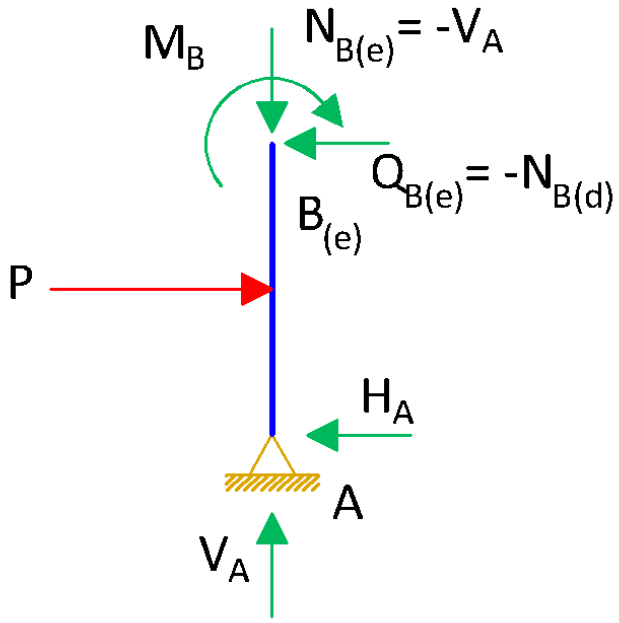


Ponto de Partida para Traçado de Diagramas (1)

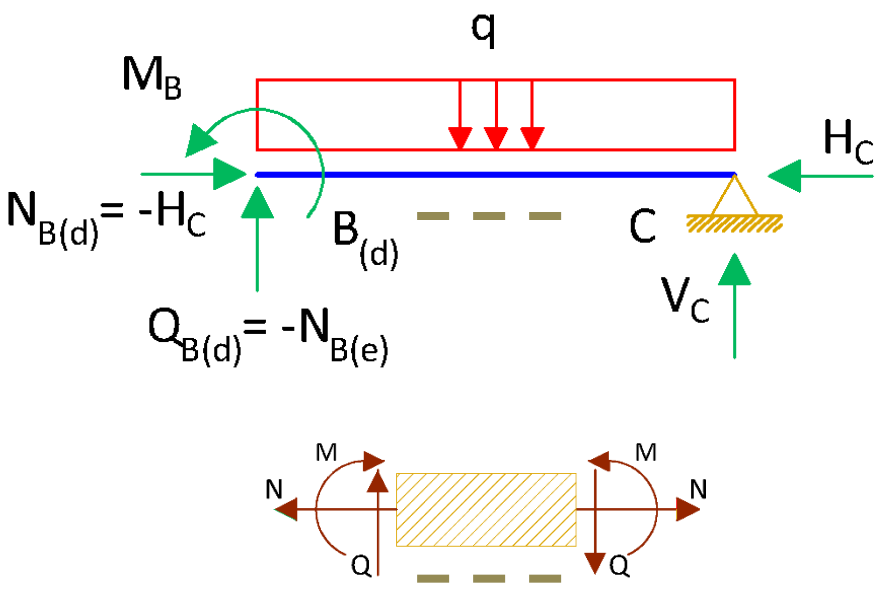


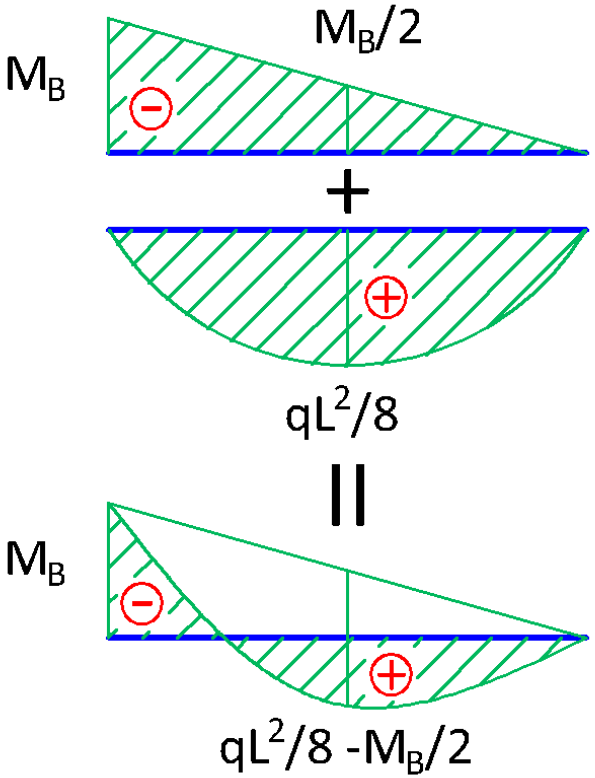
Ponto de Partida para Traçado de Diagramas (2)



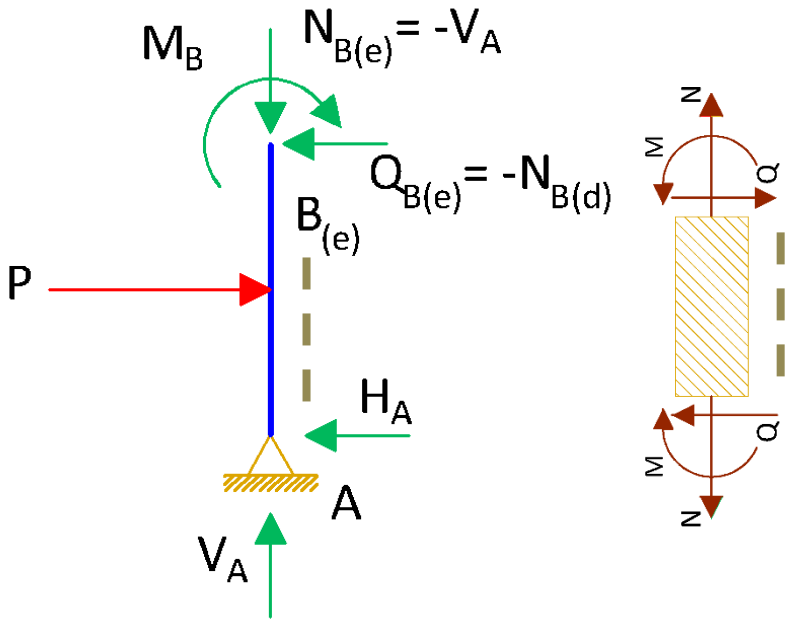


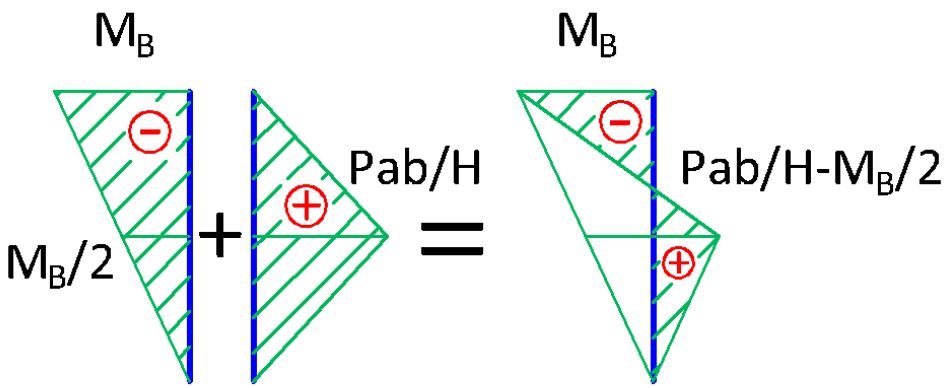
Traçado de Diagramas – Momentos Fletores (1)





Traçado de Diagramas – Momentos Fletores (2)





Traçado de Diagramas – Momentos Fletores (3)

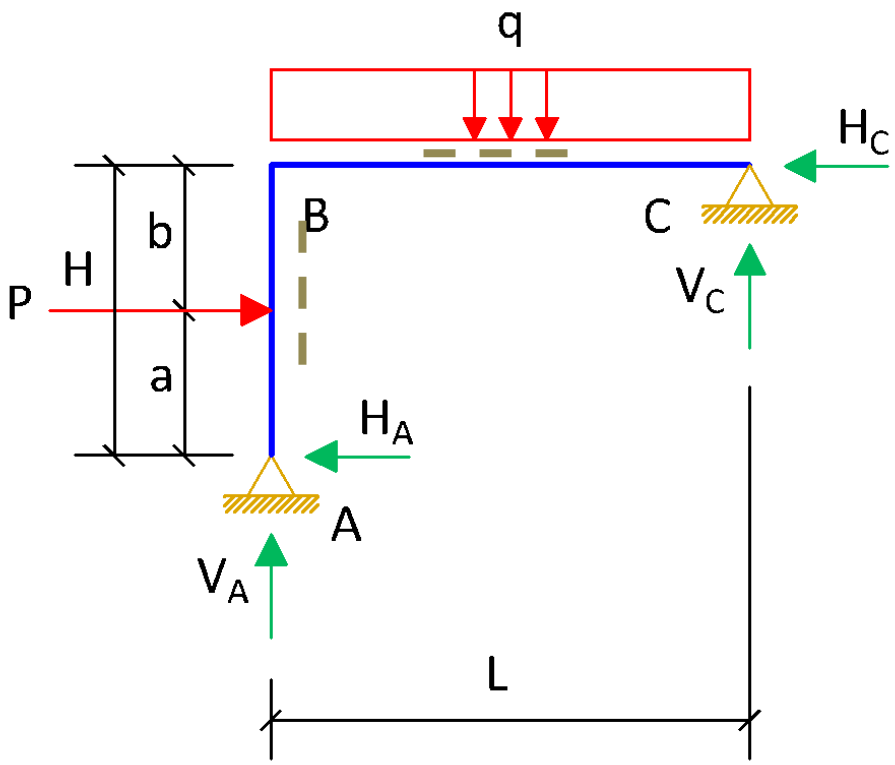
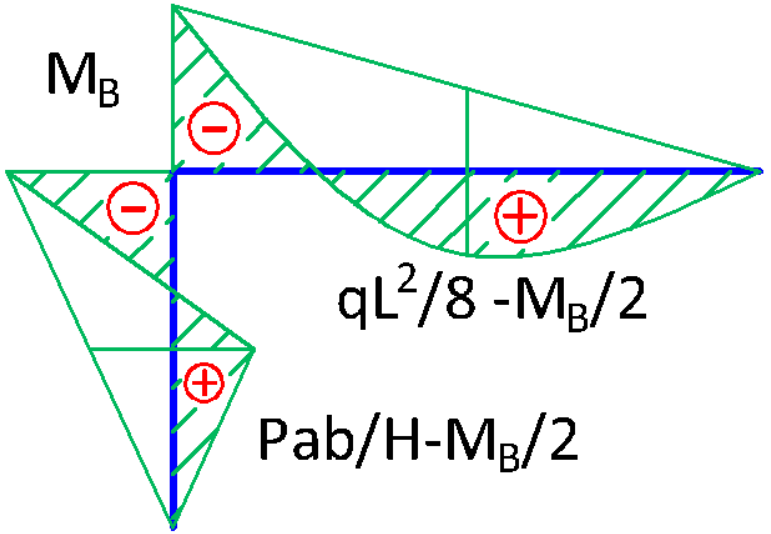
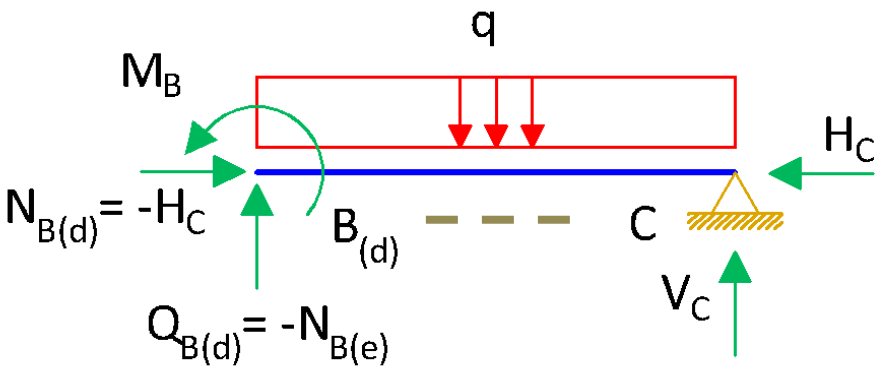
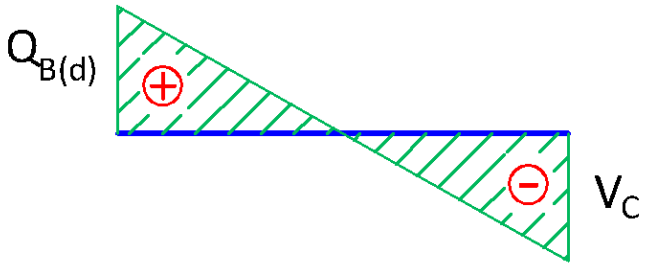


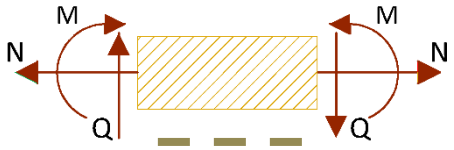
Diagrama de Momentos Fletores



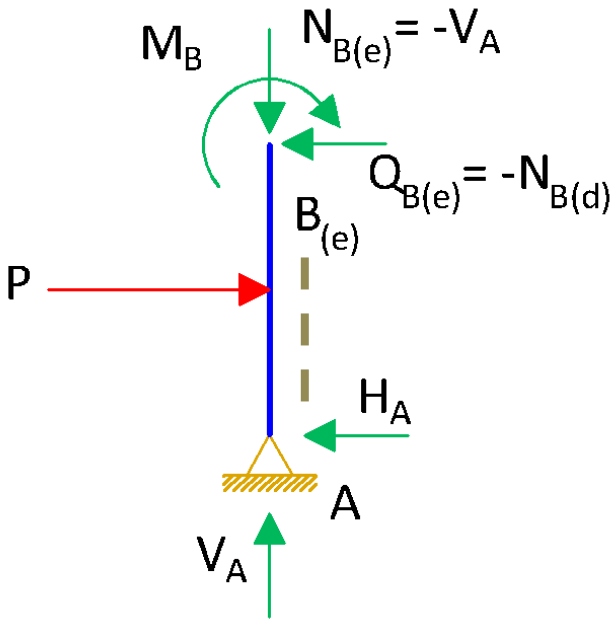
Traçado de Diagramas – Esforços Cortantes (1)



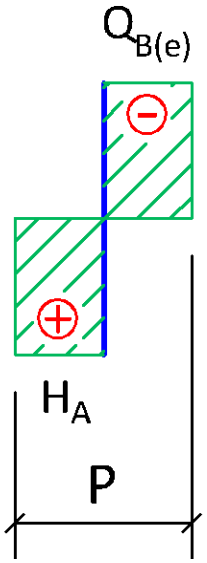




Traçado de Diagramas – Esforços Cortantes (2)







Traçado de Diagramas – Esforços Cortantes (3)

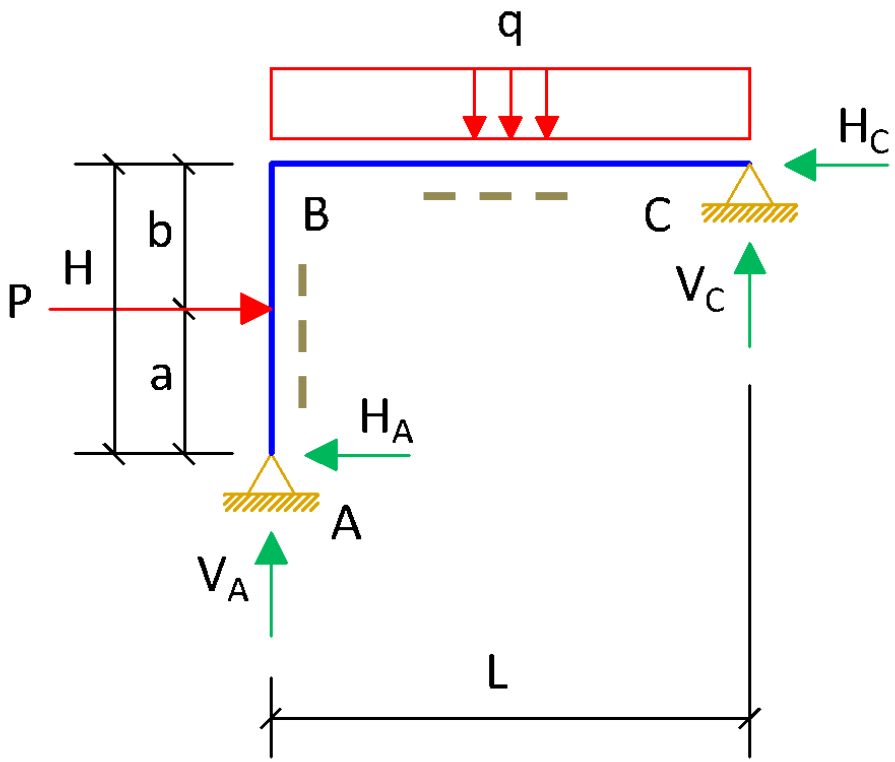
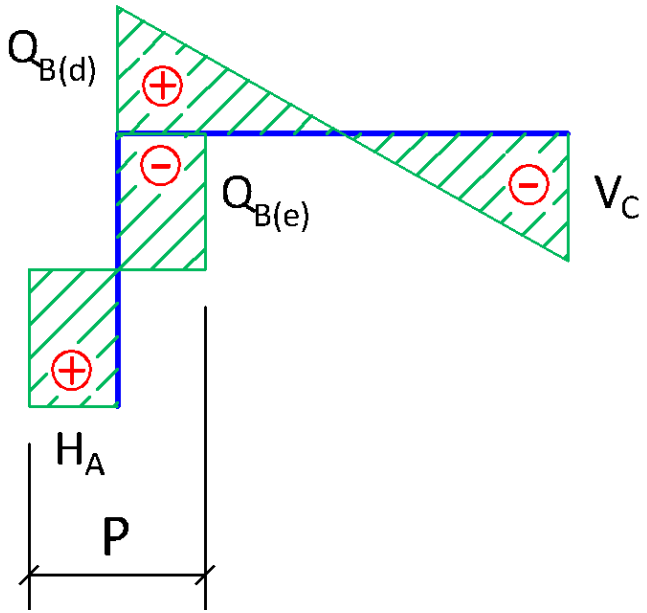
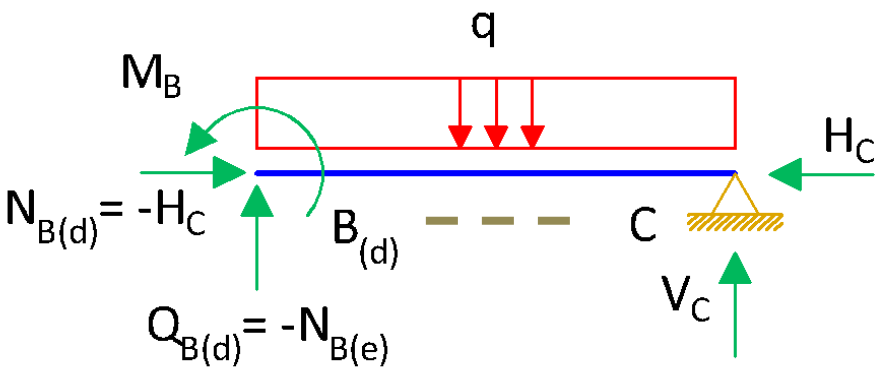
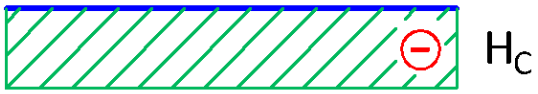


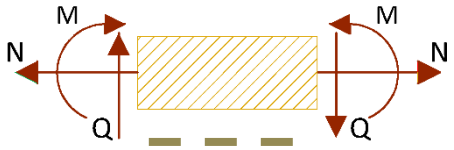
Diagrama de Esforços Cortantes



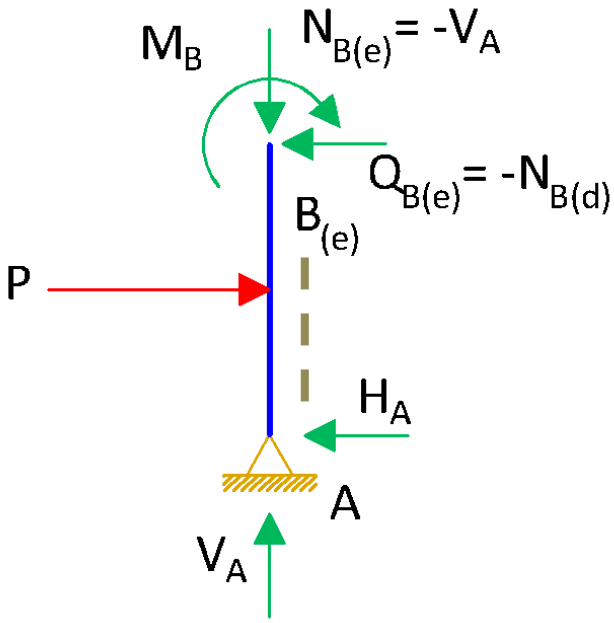
Traçado de Diagramas – Esforços Normais (1)



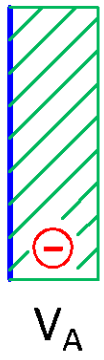




Traçado de Diagramas – Esforços Normais (2)







Traçado de Diagramas – Esforços Normais (3)

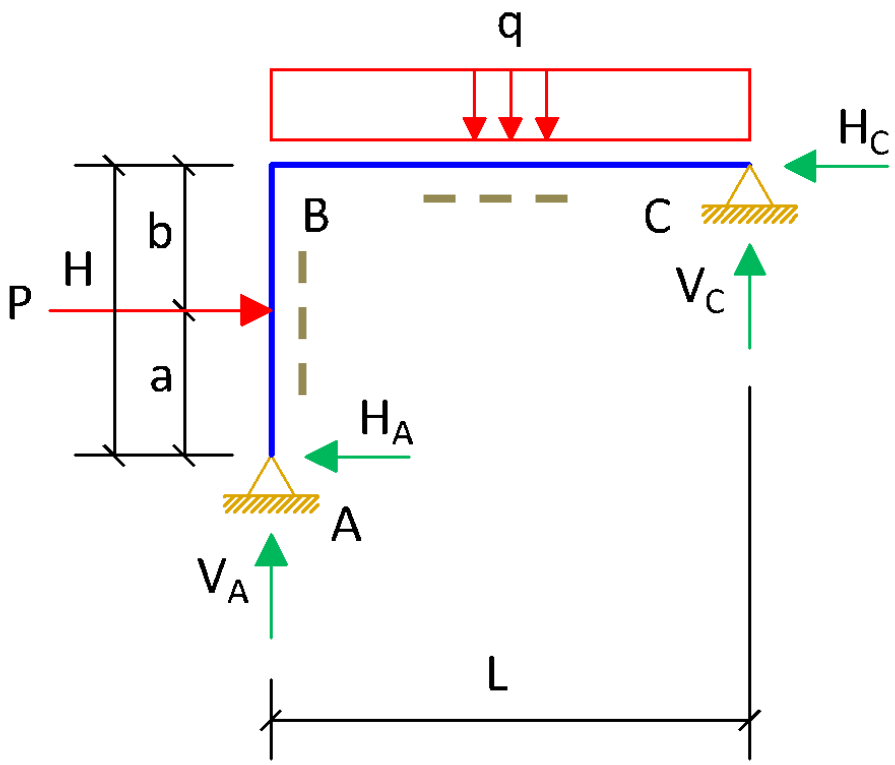
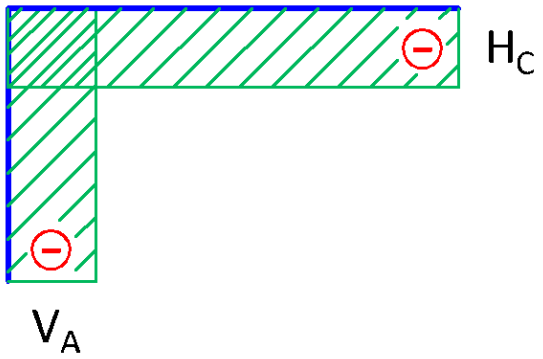
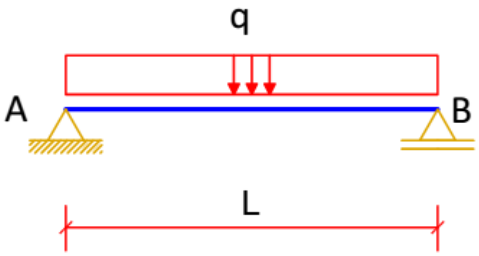


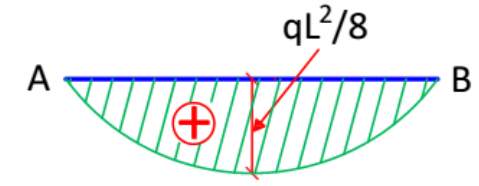
Diagrama de Esforços Normais (Axiais)



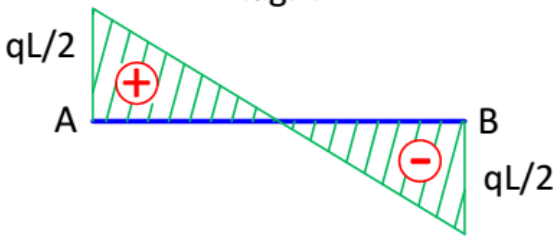
Vigas Bi-Apoiadas Básicas

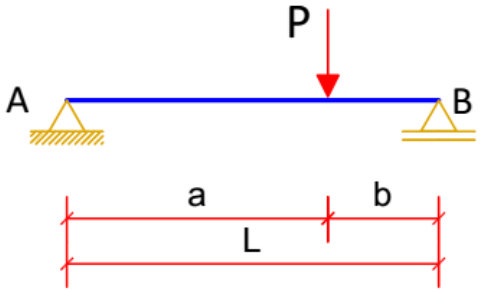


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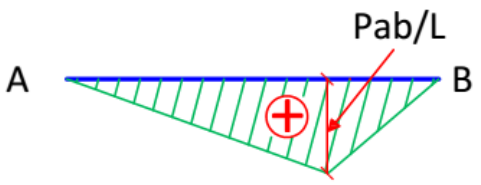


Diag. V

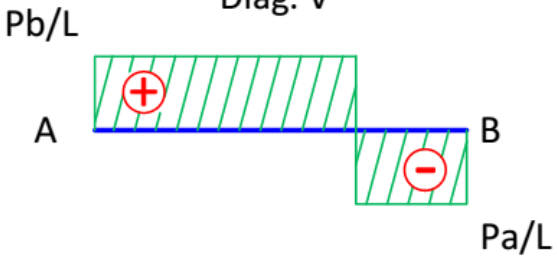


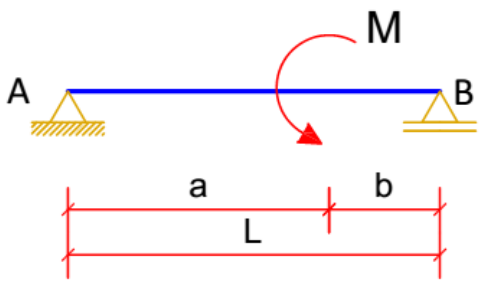


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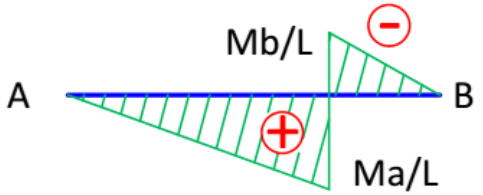


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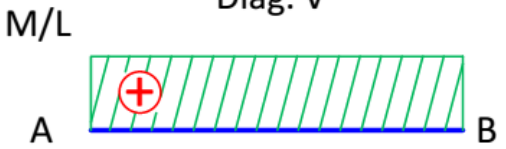




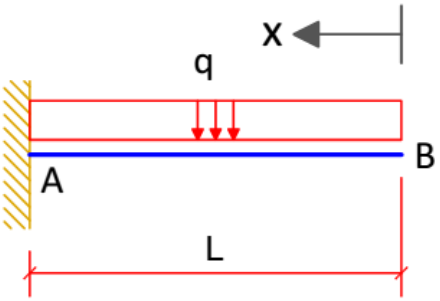
Diag. M

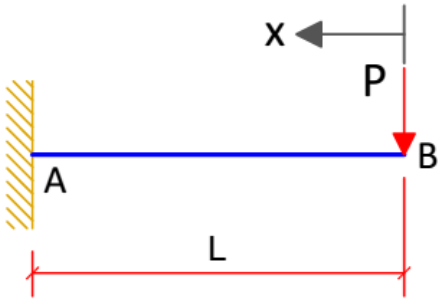


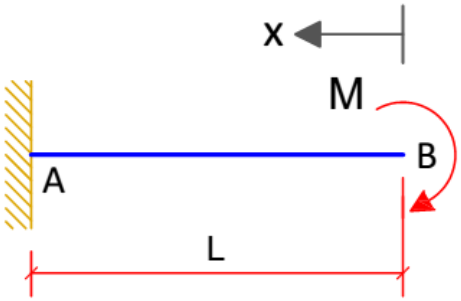
Diag. V

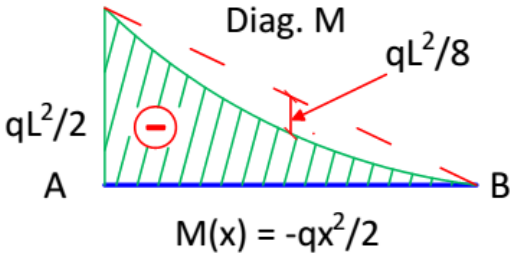


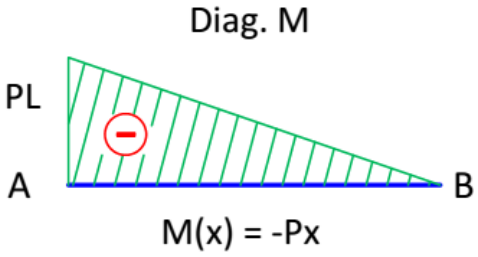
Vigas Engastadas Básicas

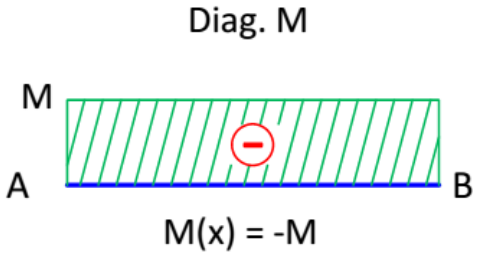


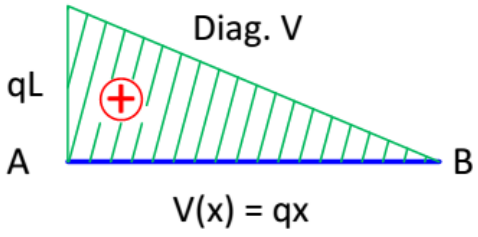


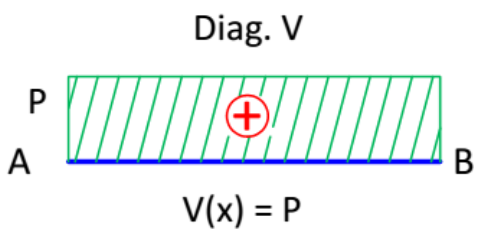


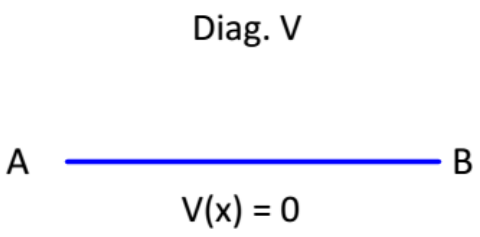








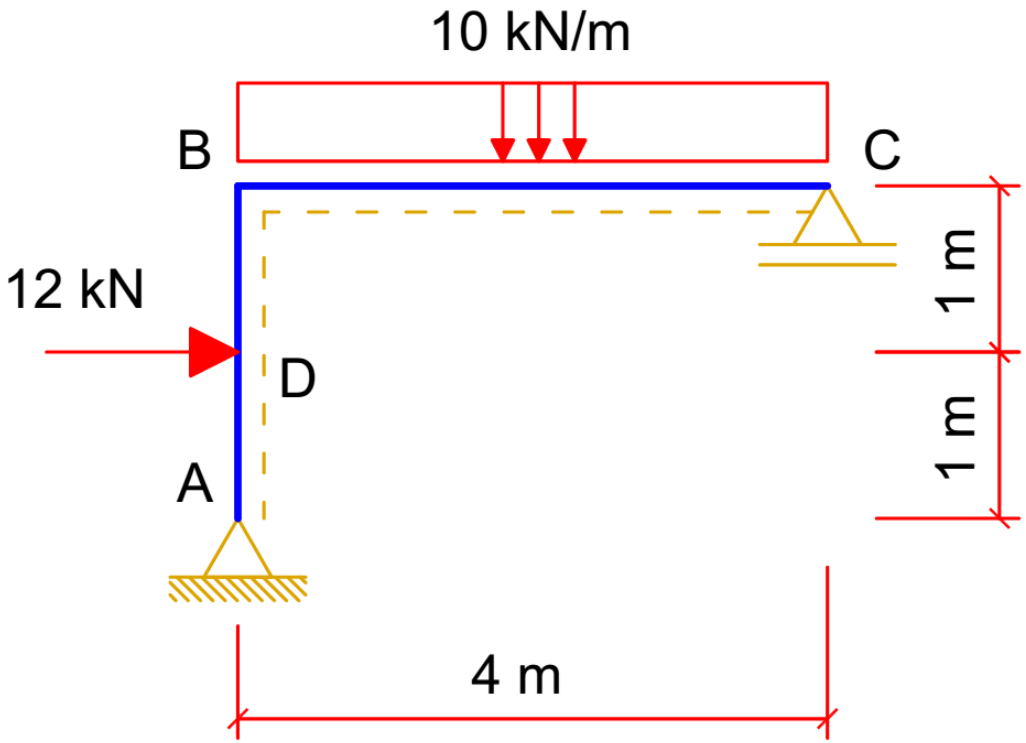




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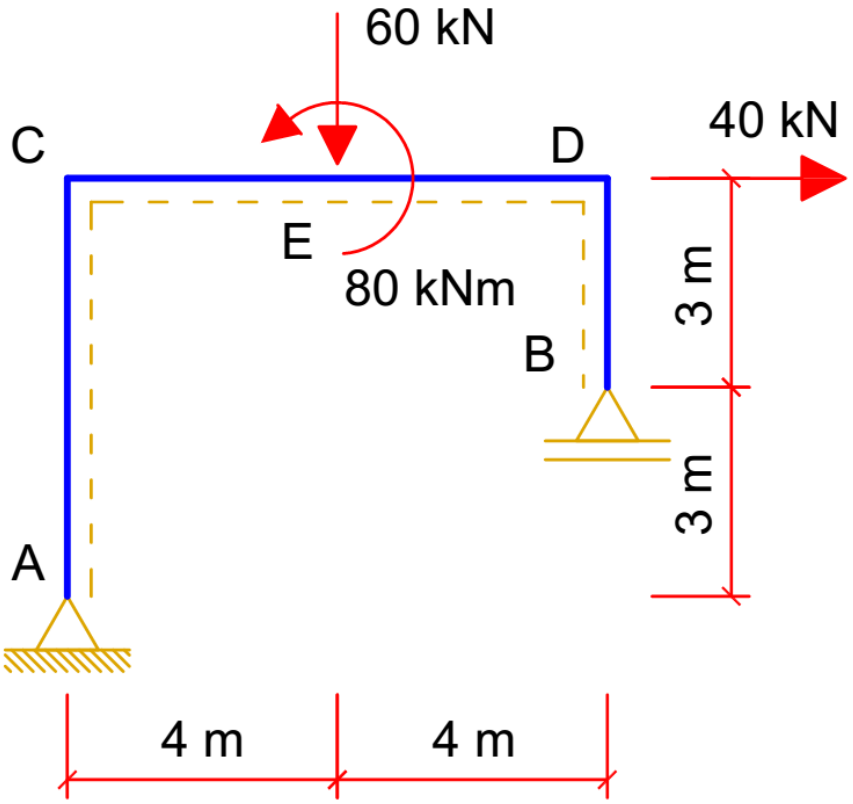
Exercício TE1-4.1

- Escreva as equações e trace os diagramas de momento fletor, esforço cortante e esforço normal para o pórtico abaixo:



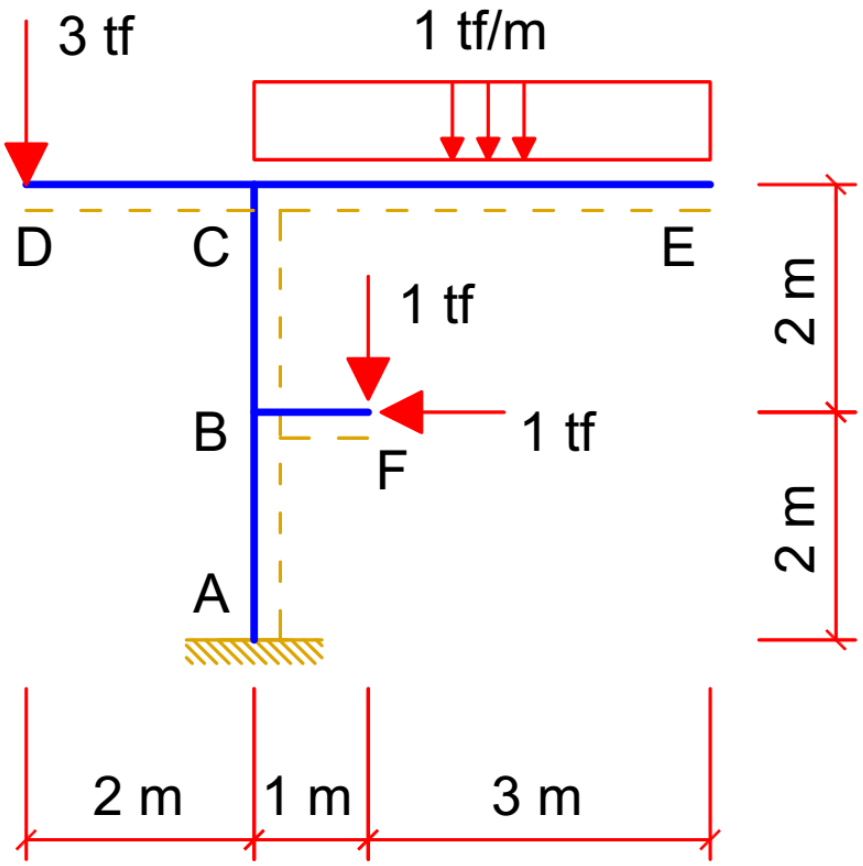
Exercício TE1-4.2

- Trace os diagramas de momento fletor, esforço cortante e esforço normal para o pórtico abaixo:



Exercício TE1-4.3

- Trace os diagramas de momento fletor, esforço cortante e esforço normal para o pórtico abaixo:



Exercício TE1-4.4

- Escreva as equações e trace os diagramas de momento fletor e esforço cortante para o pórtico abaixo:

