

SEM0104 - Aula 5

Cálculo da Velocidade: Velocidade Relativa

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USP - EESC - SEM

LabRoM

Prof. Dr. Marcelo Becker - SEM - EESC - USP

Sumário da Aula

Método Gráfico – Análise de Mecanismos

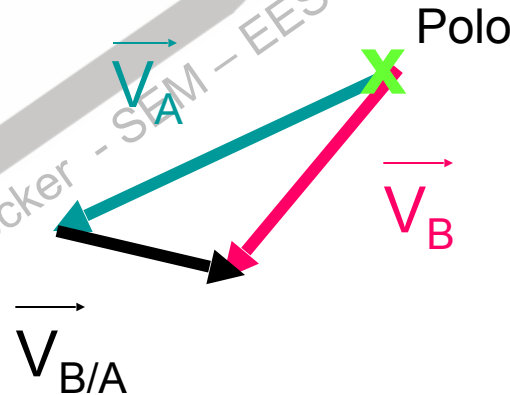
- **Cálculo de Velocidade**
 - Velocidade Relativa
 - Definição
 - Exemplos
- Exercícios Recomendados
- Bibliografia Recomendada

Velocidade Relativa

VR - Definição

- O Método da Velocidade Relativa emprega somas vetoriais de velocidades absolutas e relativas...

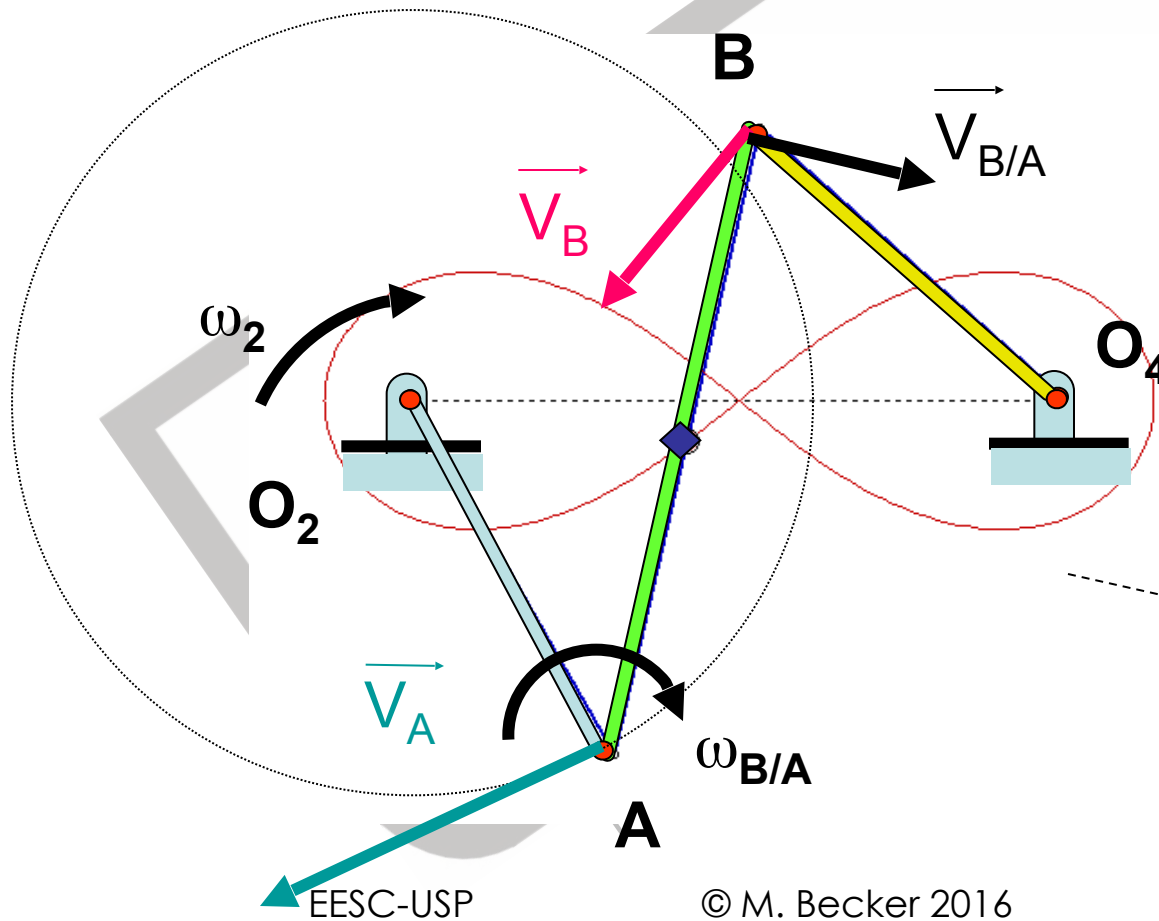
$$\vec{V}_B = \vec{V}_A + \vec{V}_{B/A}$$



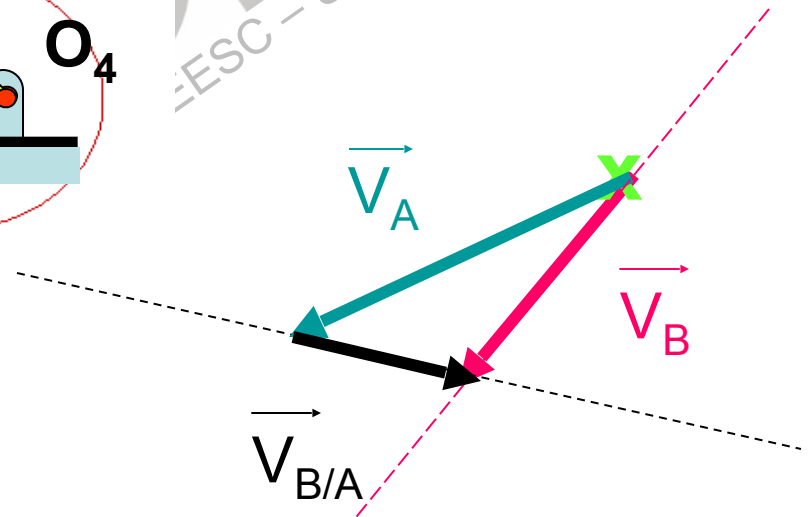
Velocidade Relativa

VR

- Exemplos



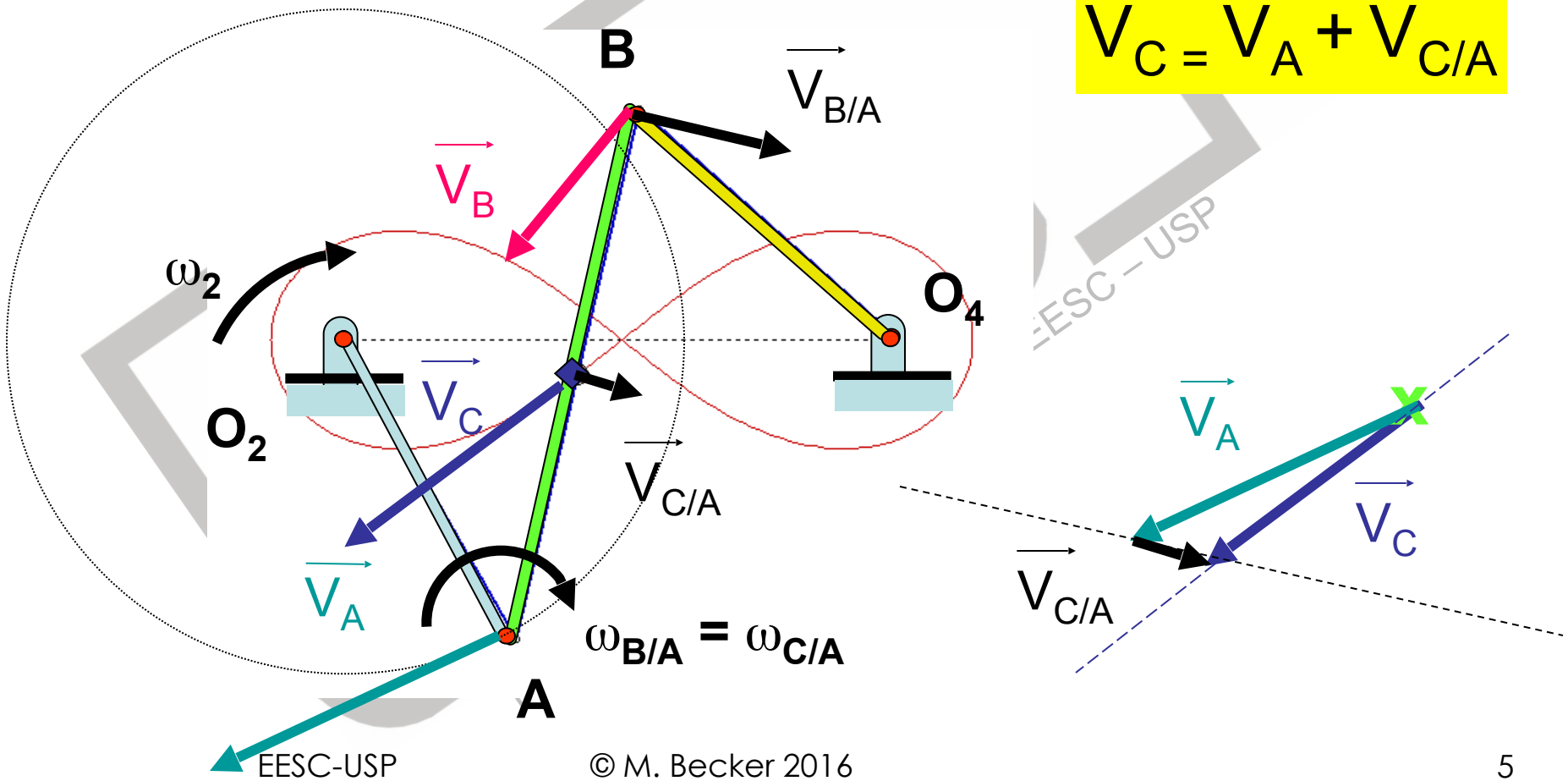
$$\vec{V}_B = \vec{V}_A + \vec{V}_{B/A}$$



Velocidade Relativa

VR

- Exemplos

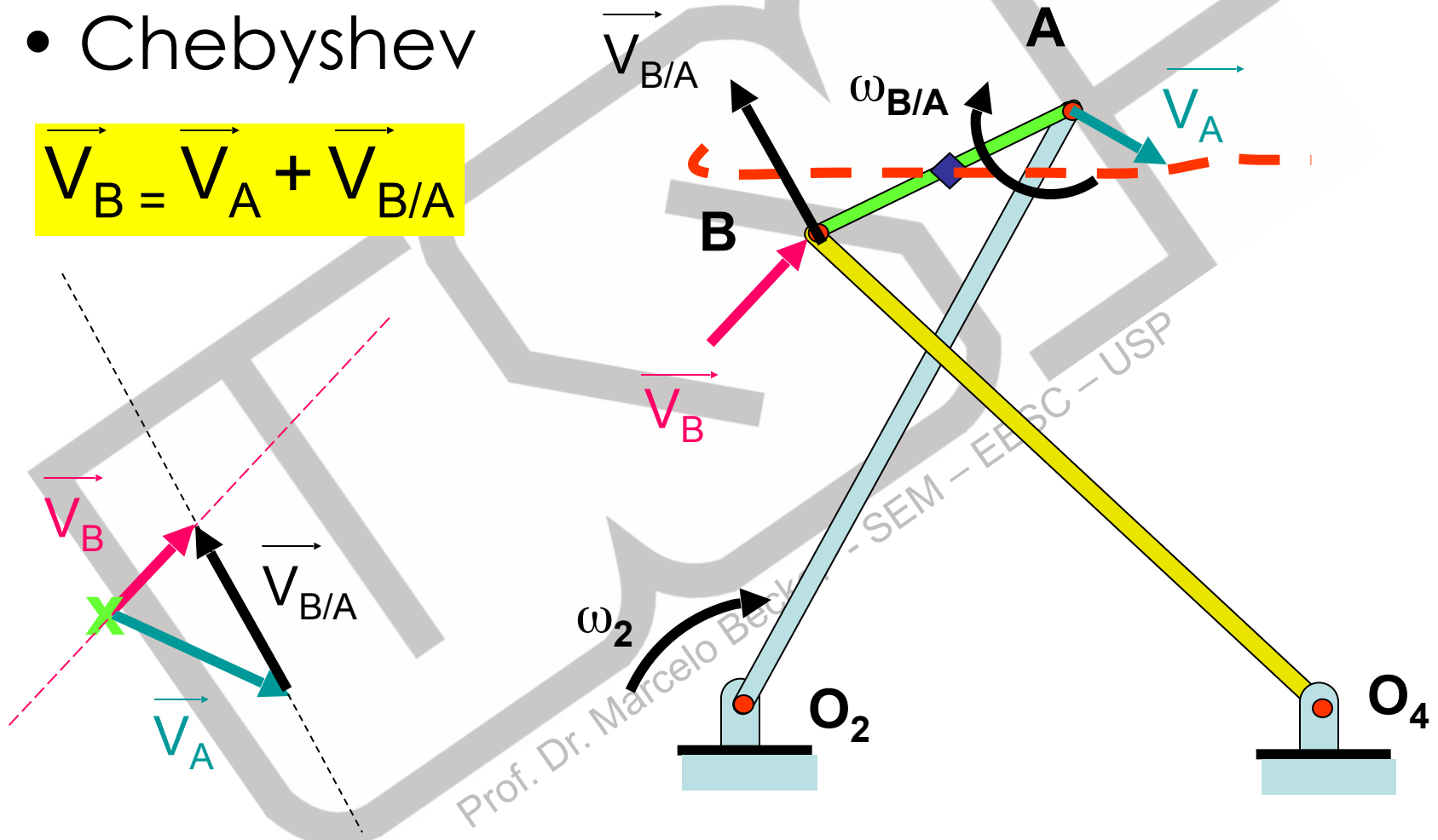


Velocidade Relativa

VR

- Chebyshev

$$\vec{V}_B = \vec{V}_A + \vec{V}_{B/A}$$

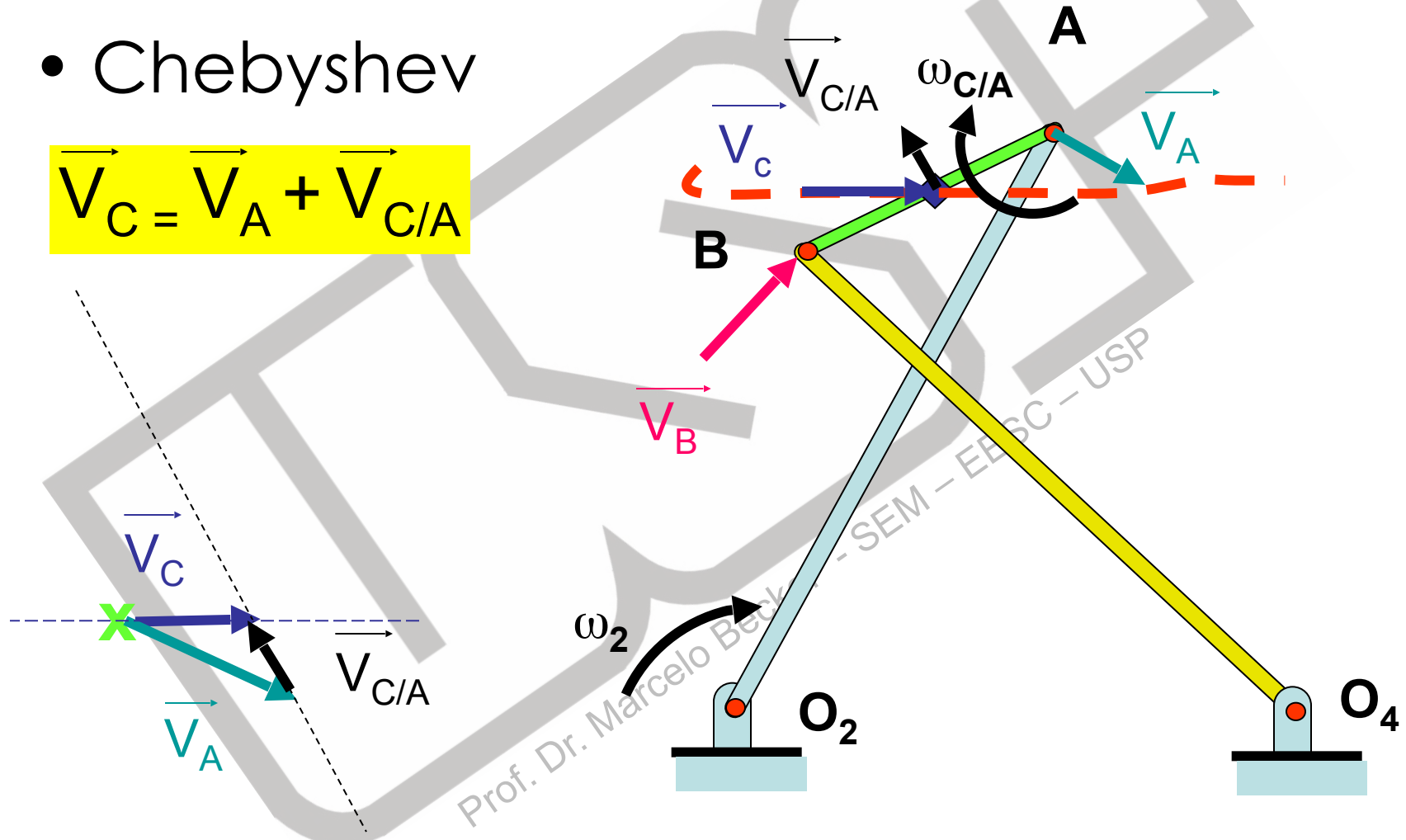


Velocidade Relativa

VR

- Chebyshev

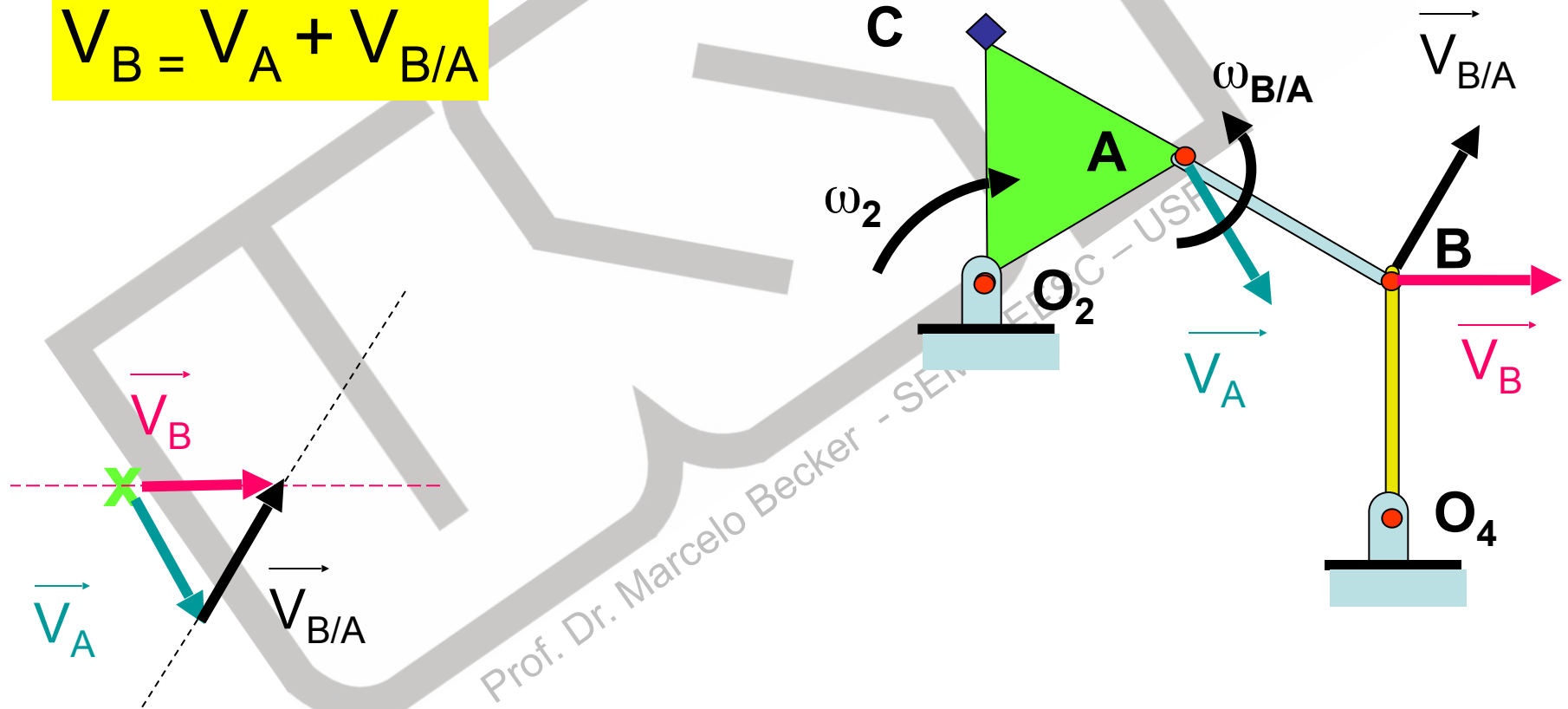
$$\vec{V}_C = \vec{V}_A + \vec{V}_{C/A}$$



Velocidade Relativa

VR

$$\vec{V}_B = \vec{V}_A + \vec{V}_{B/A}$$

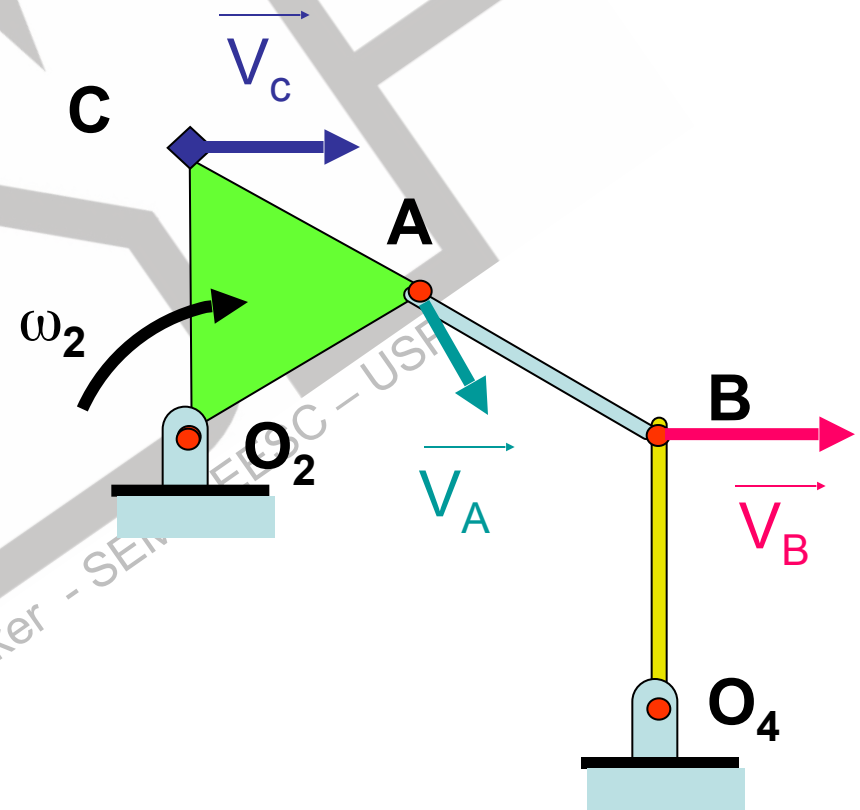
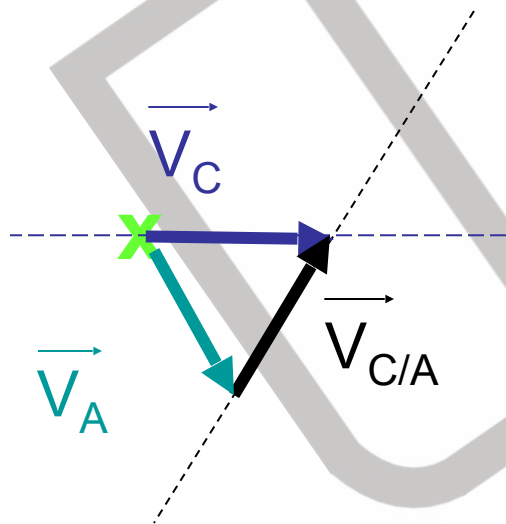


Velocidade Relativa

VR

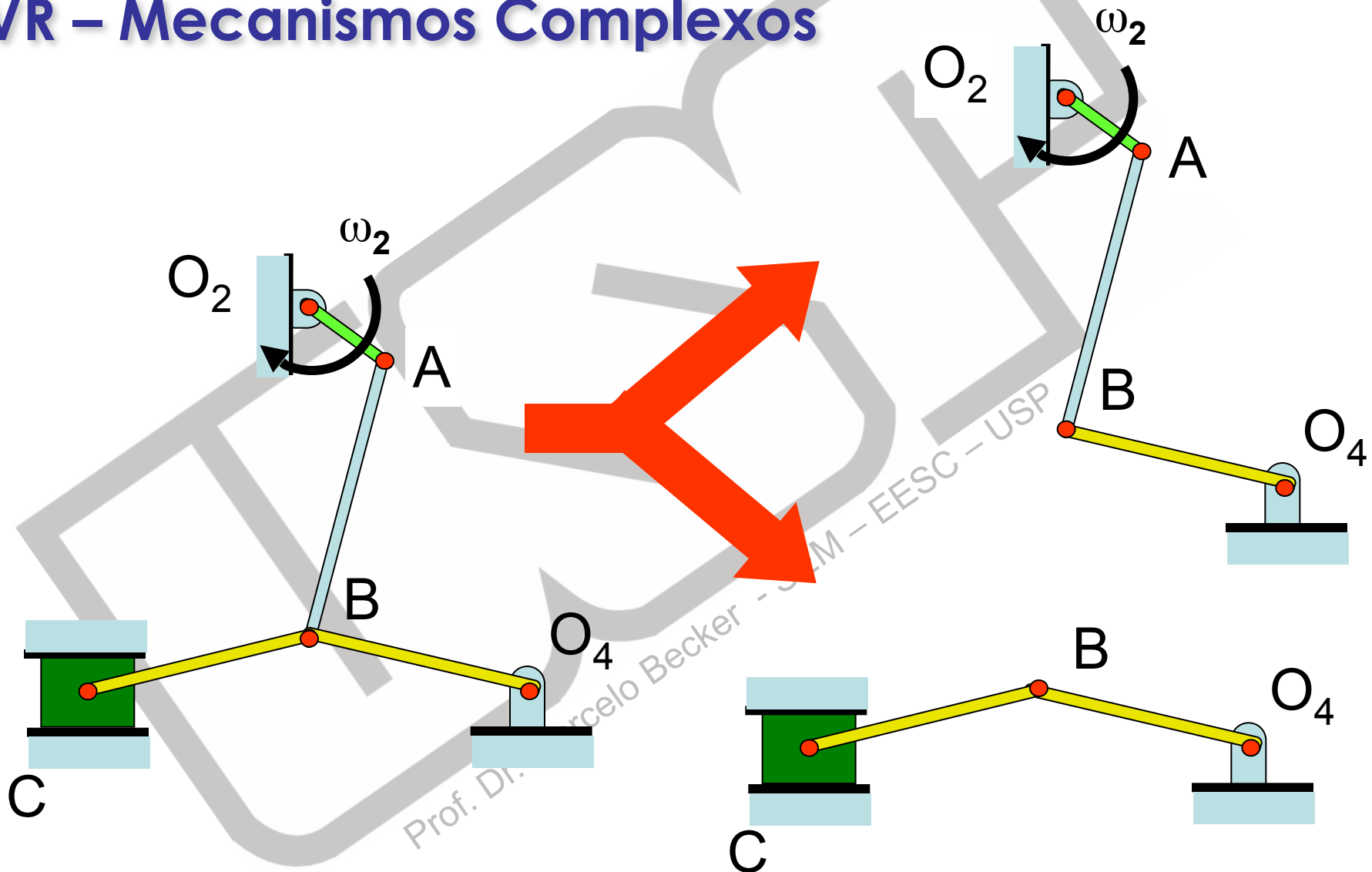
$$\vec{V}_C = \vec{\omega}_2 \times \vec{O}_2C$$

$$\vec{V}_C = \vec{V}_A + \vec{V}_{C/A}$$



Velocidade Relativa

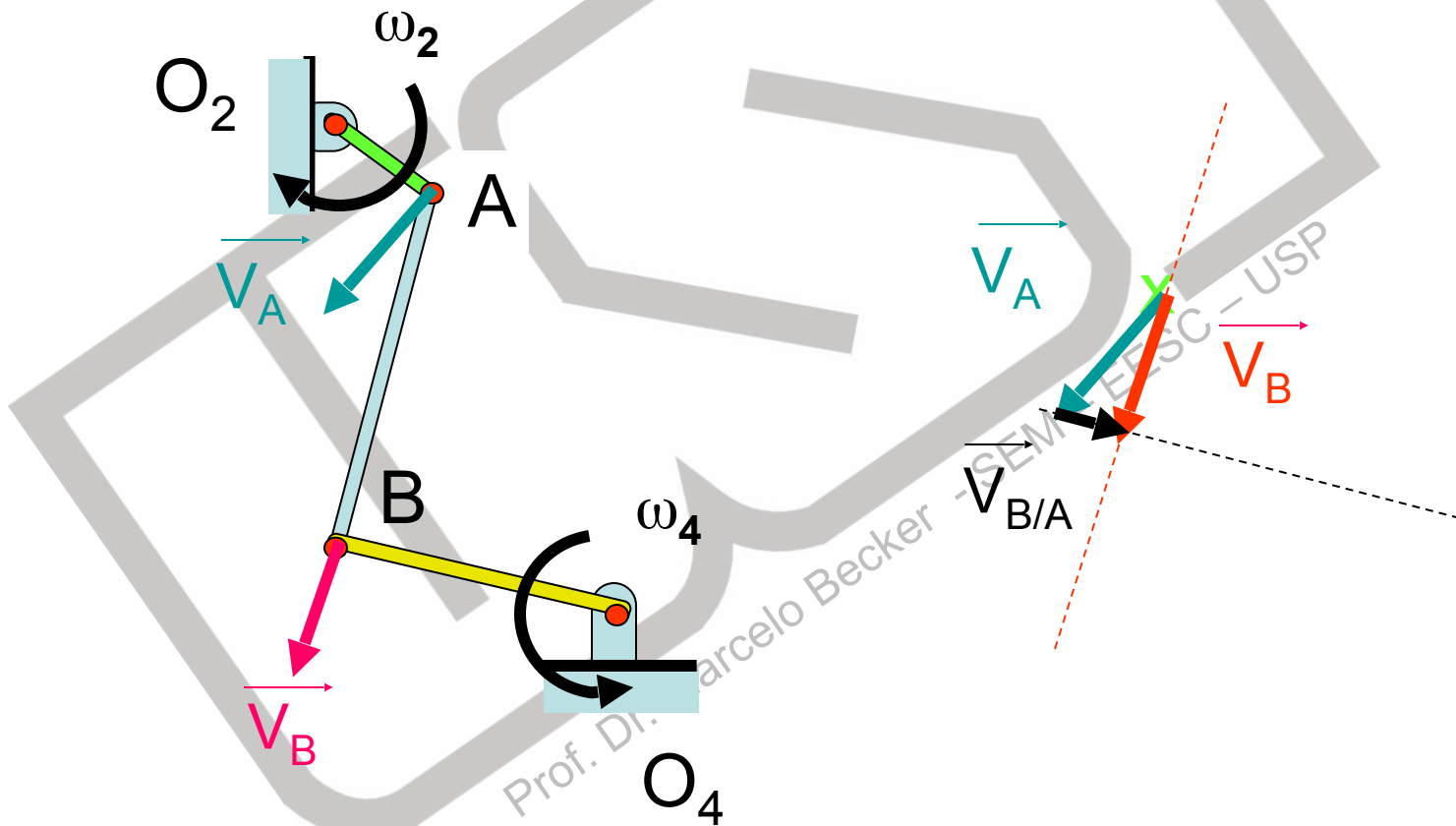
VR – Mecanismos Complexos



Velocidade Relativa

VR – Mecanismos Complexos

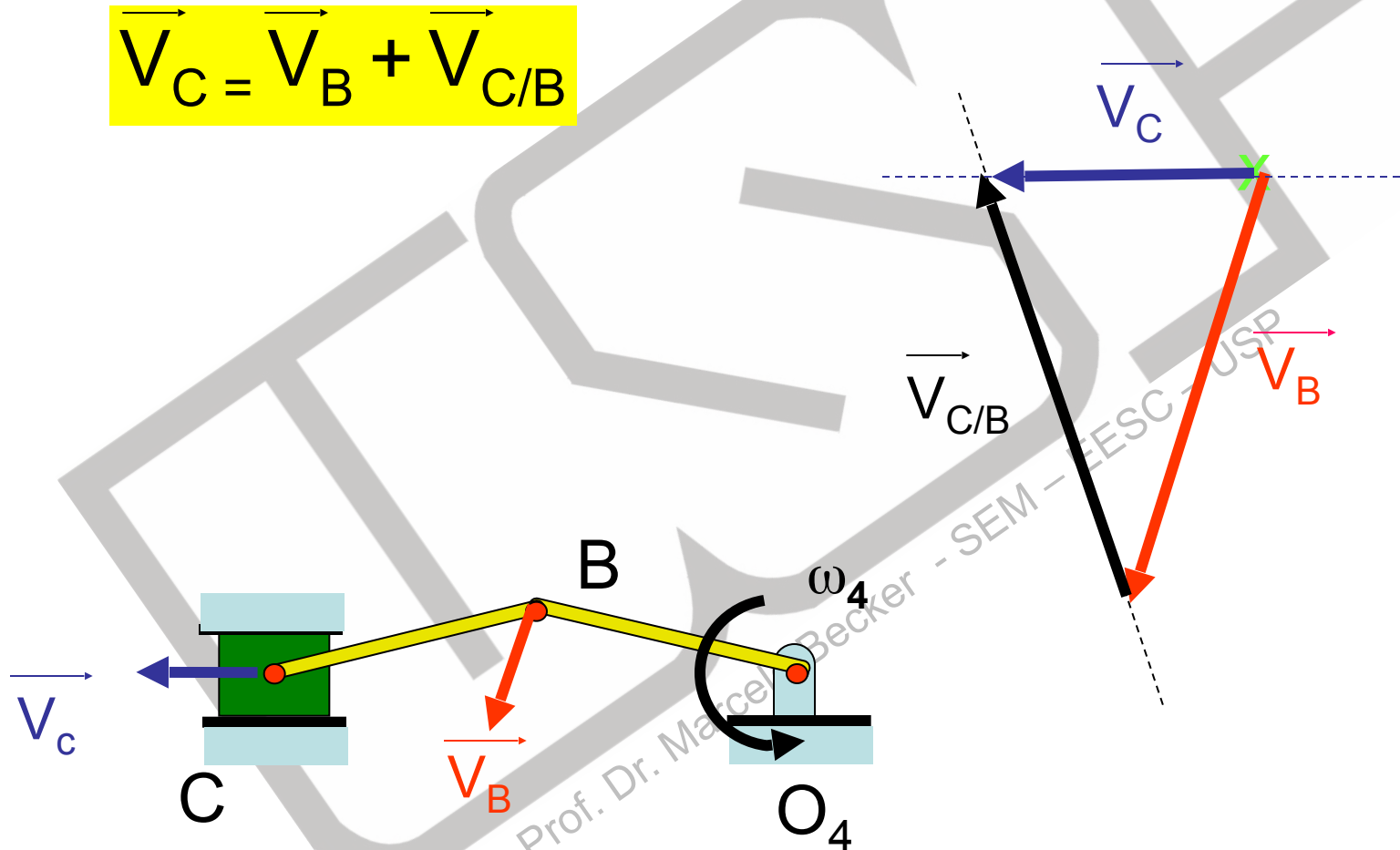
$$\vec{V}_B = \vec{V}_A + \vec{V}_{B/A}$$



Velocidade Relativa

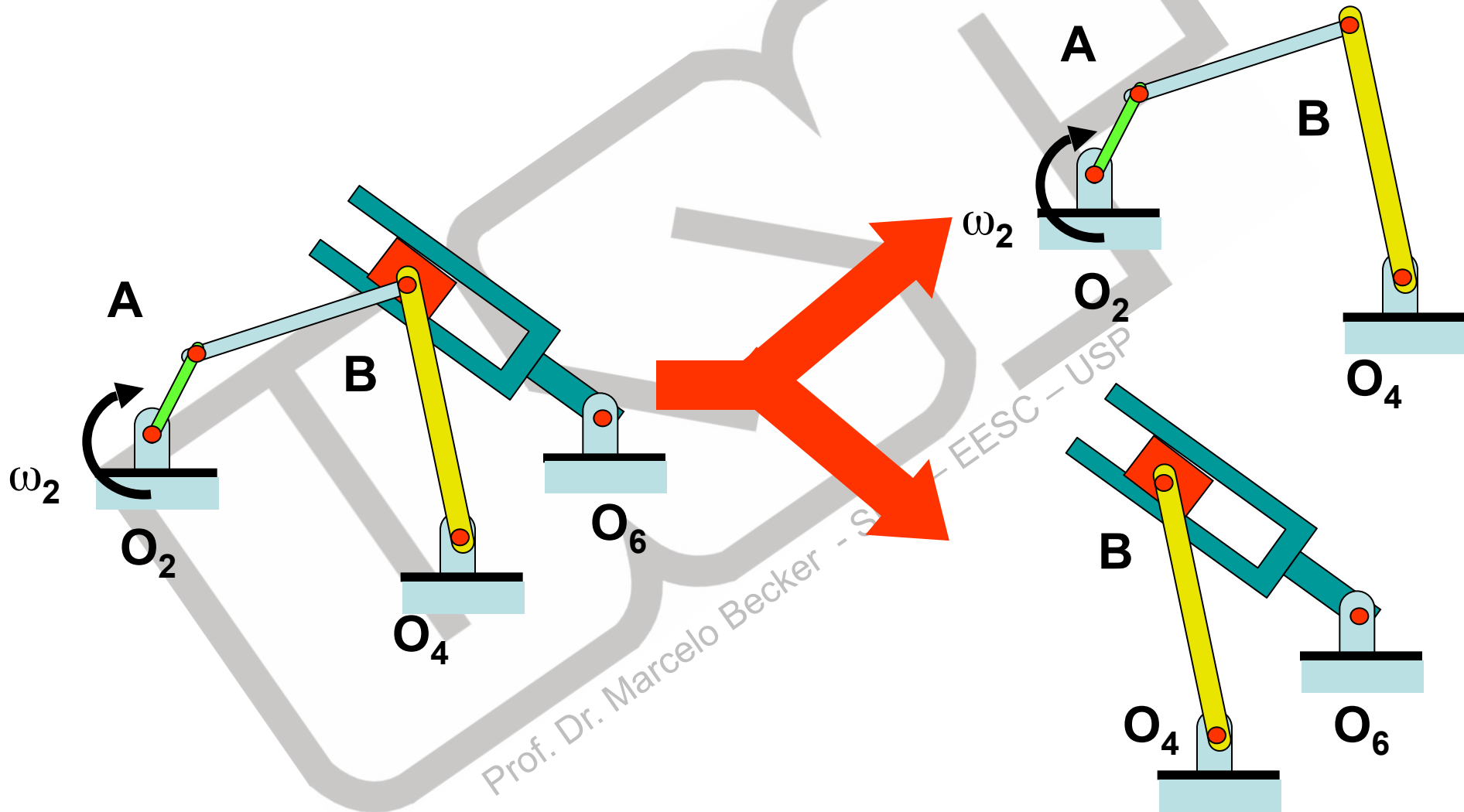
VR – Mecanismos Complexos

$$\vec{V}_C = \vec{V}_B + \vec{V}_{C/B}$$



Velocidade Relativa

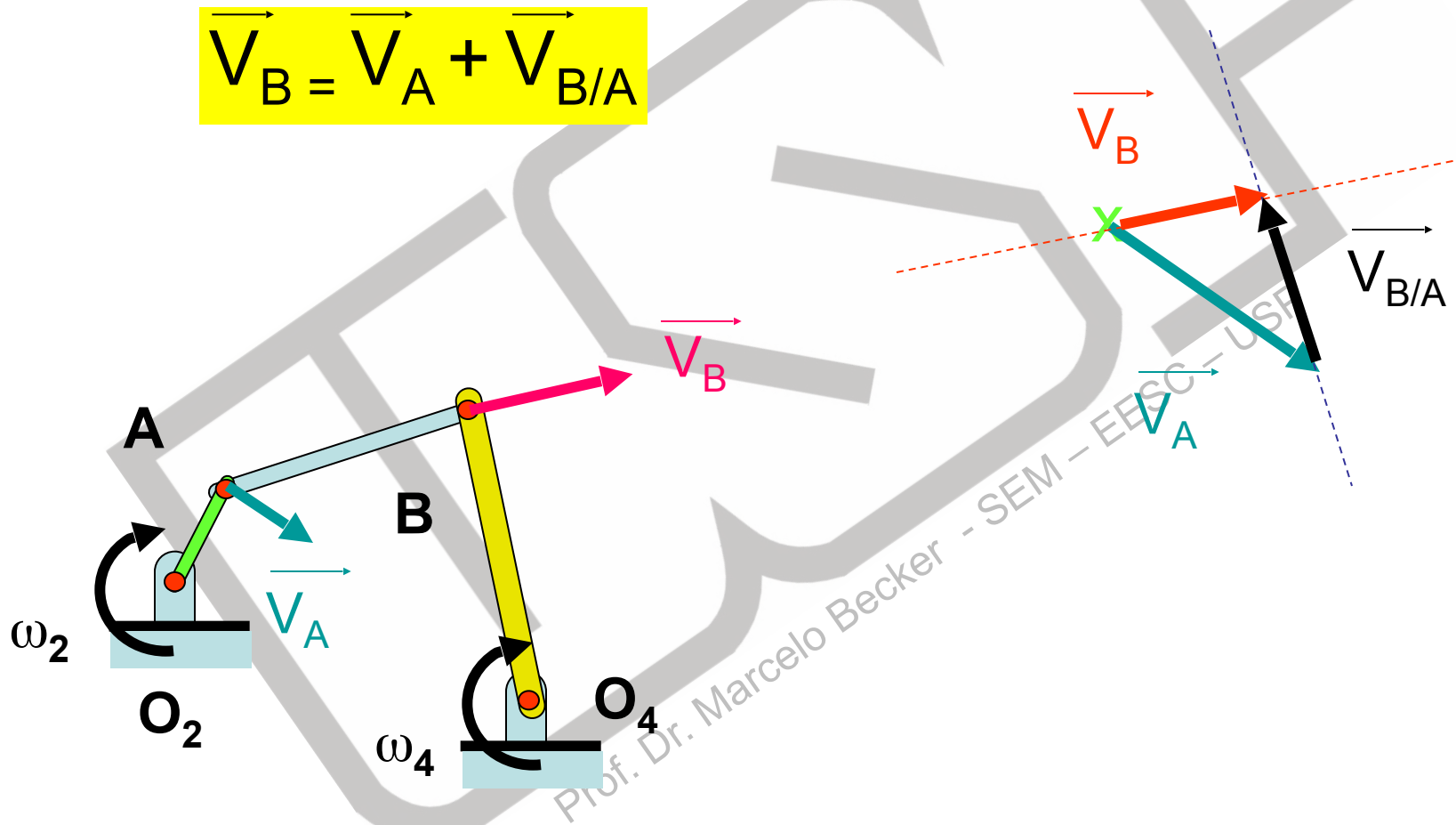
VR – Mecanismos Complexos



Velocidade Relativa

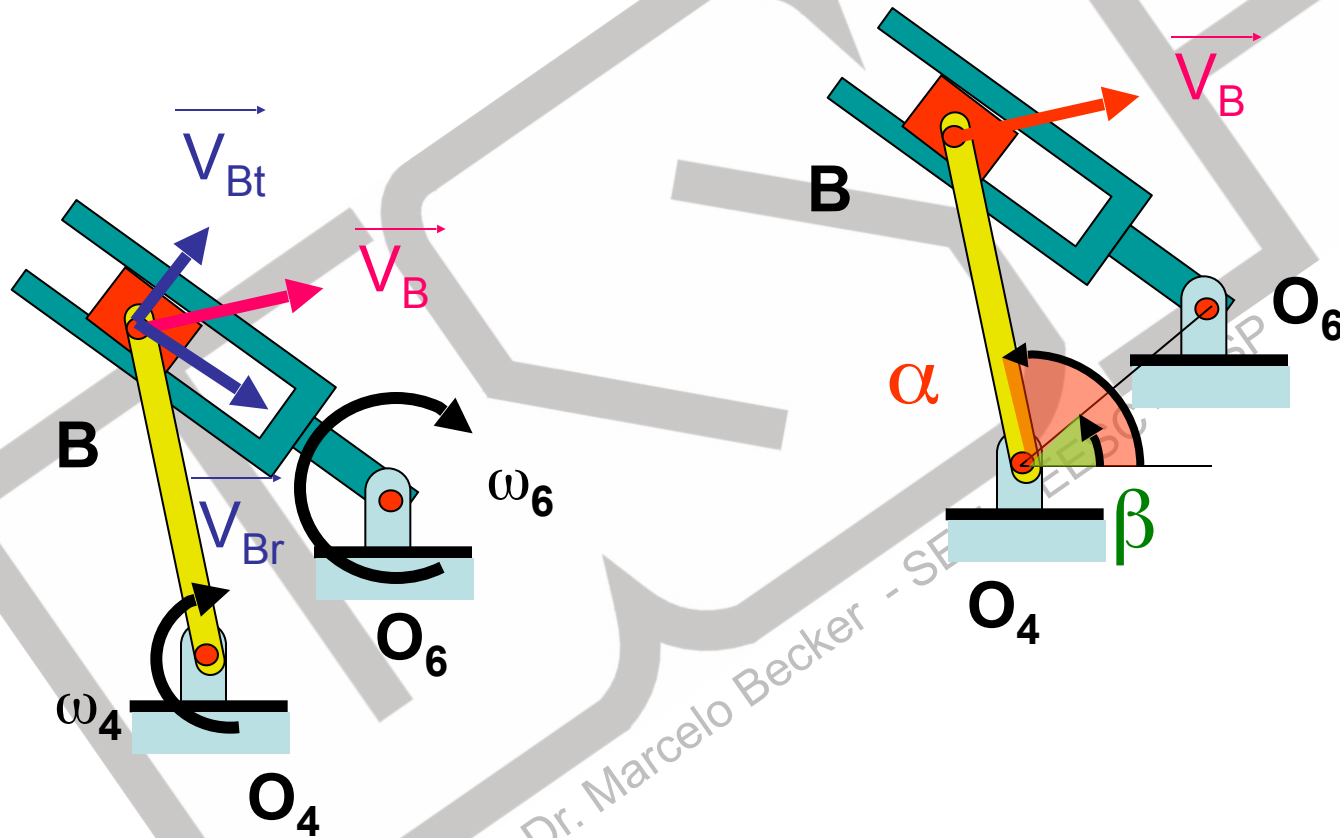
VR – Mecanismos Complexos

$$\vec{V}_B = \vec{V}_A + \vec{V}_{B/A}$$



Velocidade Relativa

VR – Mecanismos Complexos



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Cálculo de Velocidade

Velocidade Relativa

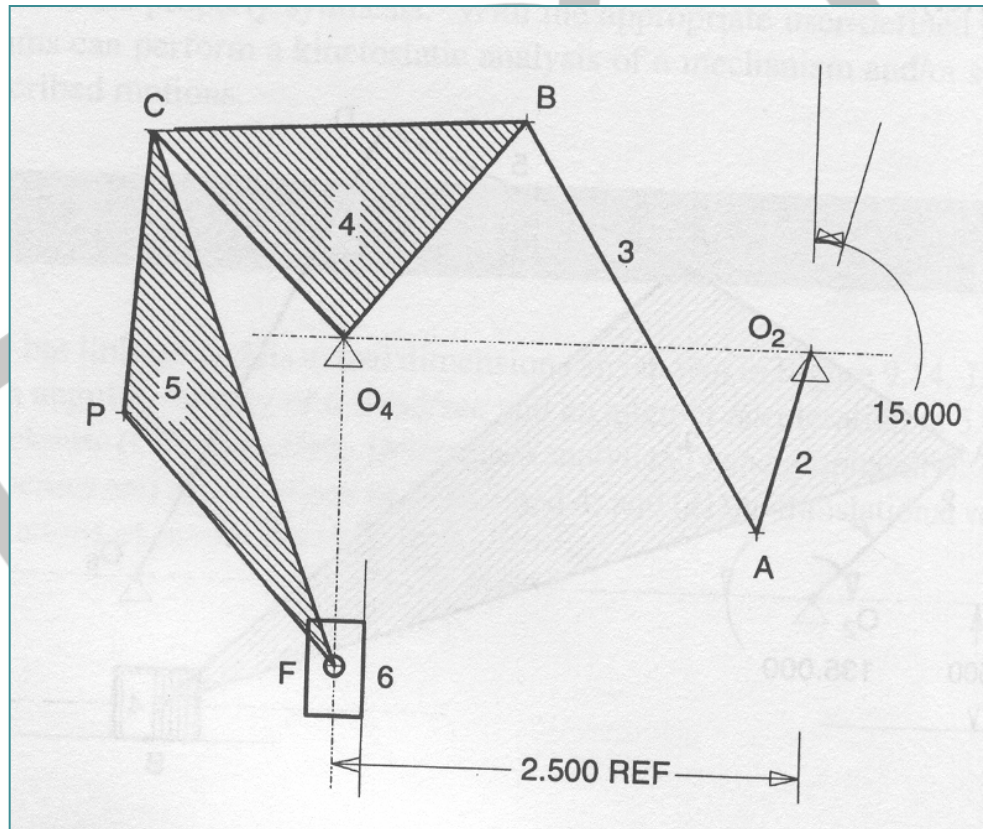
Definição

Exemplos

- **Exercícios Recomendados**
- Bibliografia Recomendada

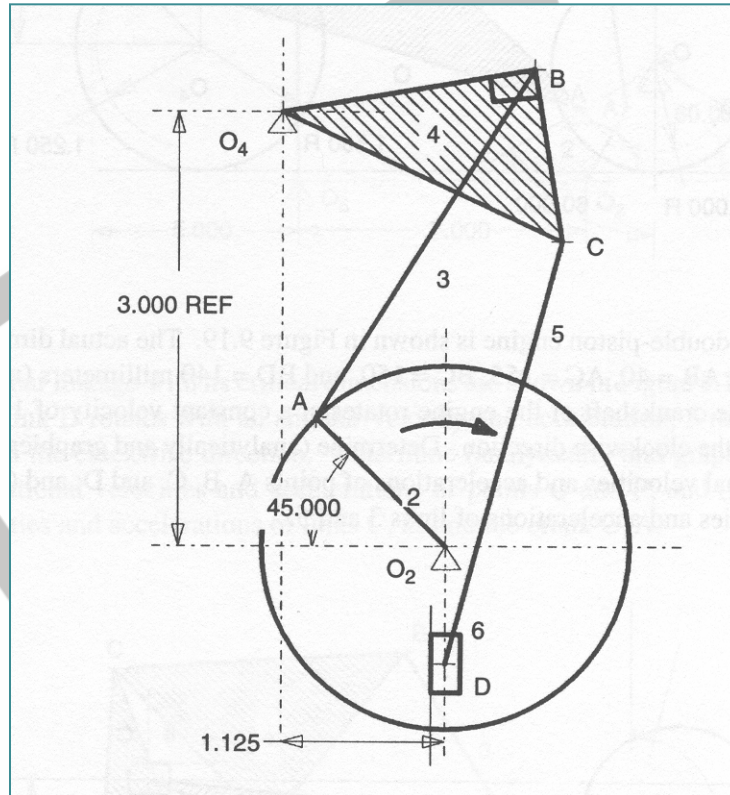
Exercícios Recomendados

1



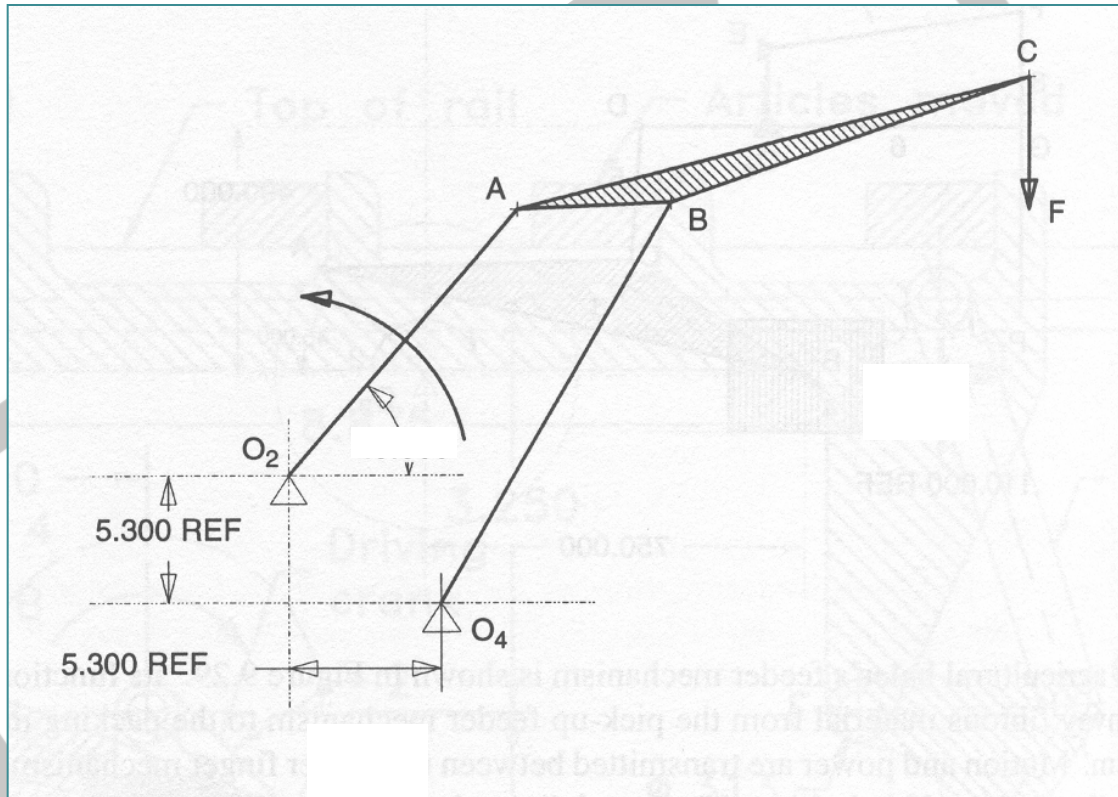
Exercícios Recomendados

2



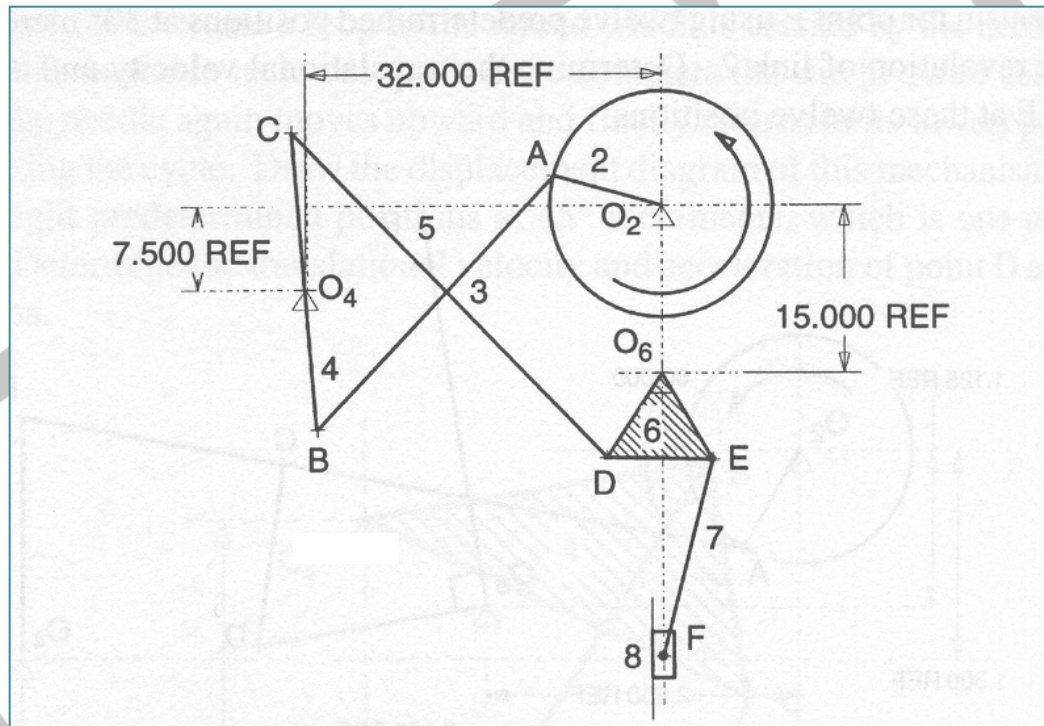
Exercícios Recomendados

3



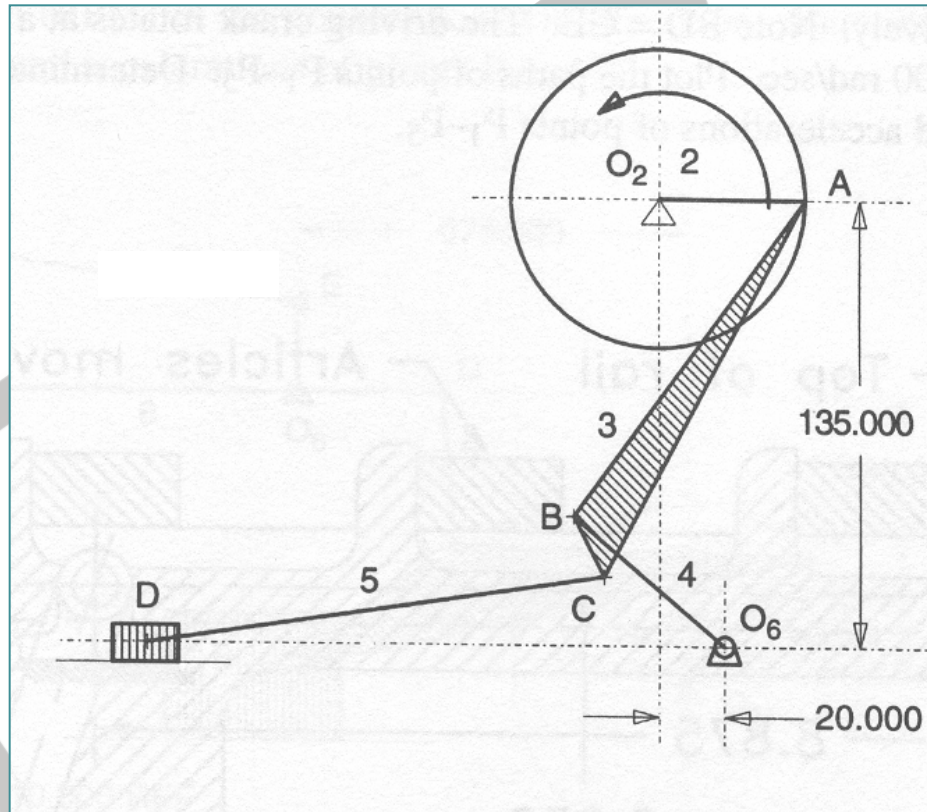
Exercícios Recomendados

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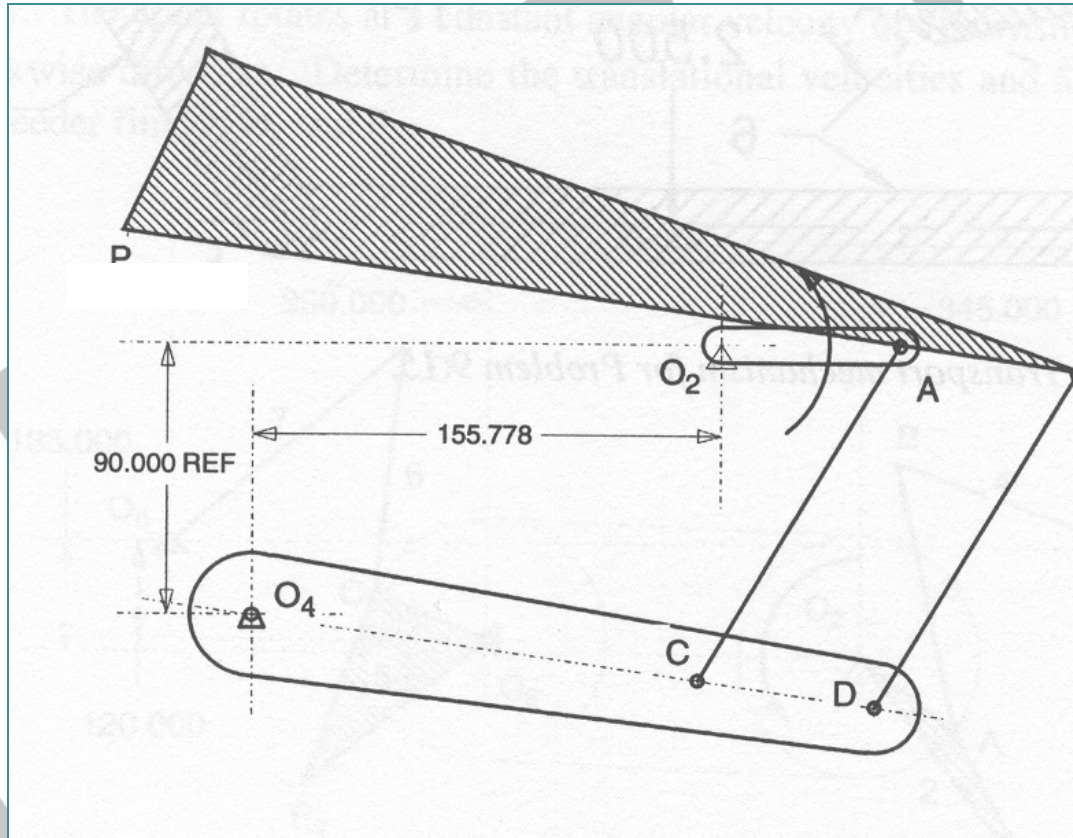
Exercícios Recomendados

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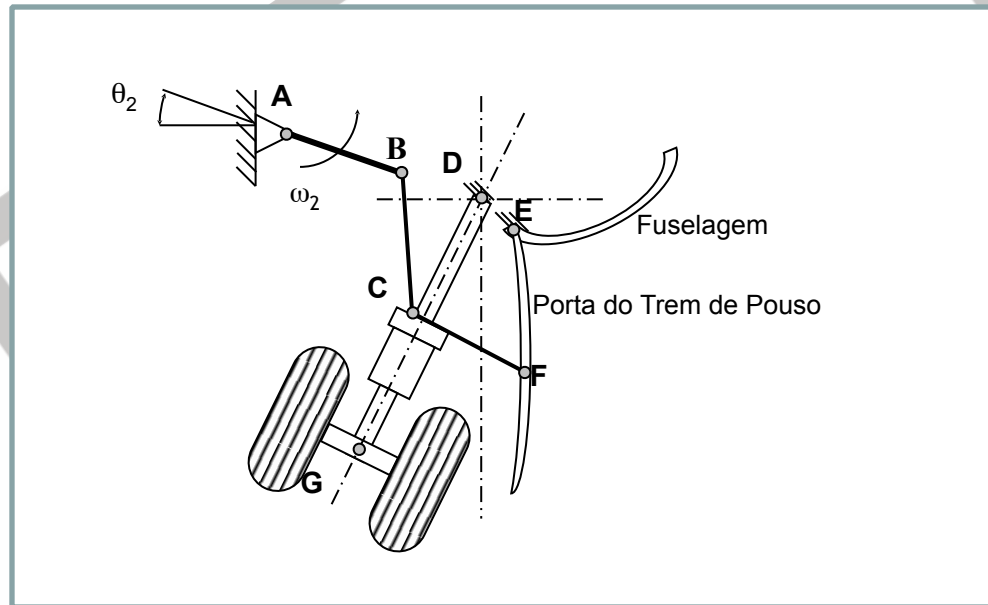
Exercícios Recomendados

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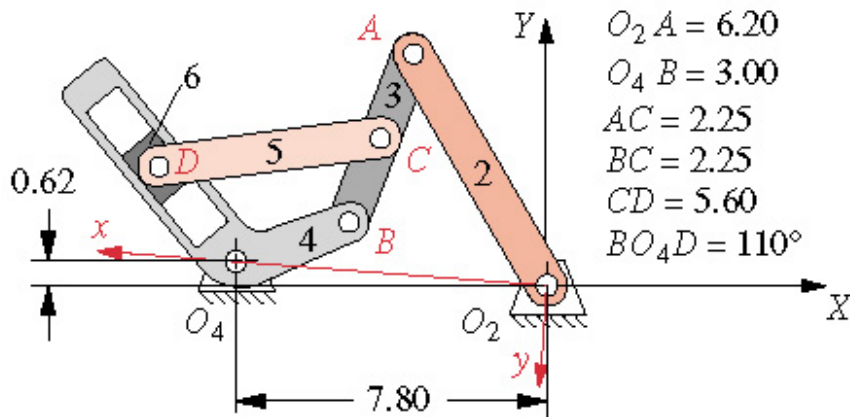
Exercícios Recomendados

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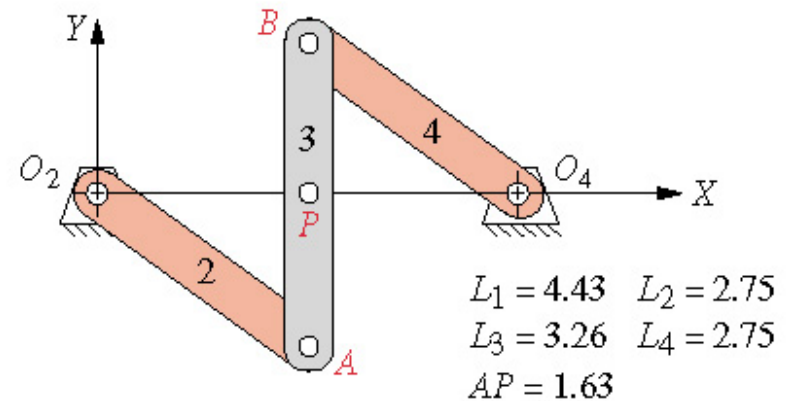
Exercícios Recomendados

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(a) Sixbar linkage

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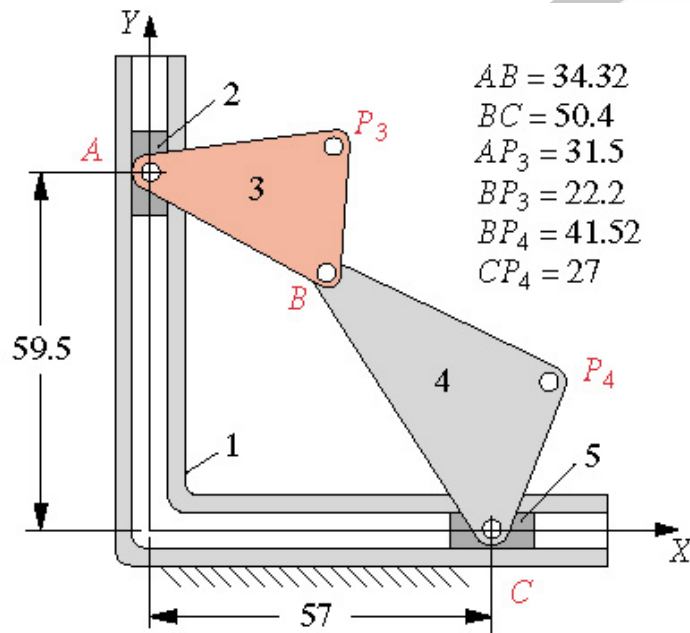


(b) Fourbar linkage

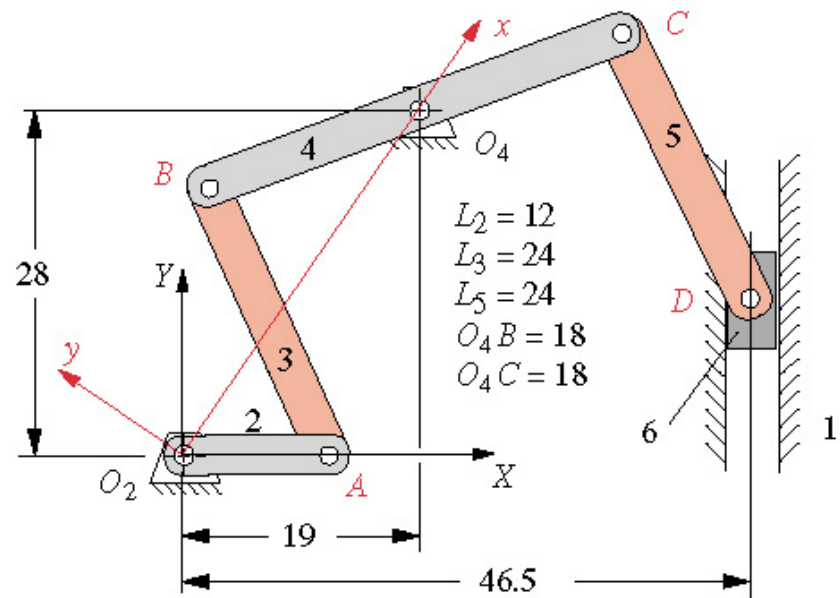
Exercícios Recomendados

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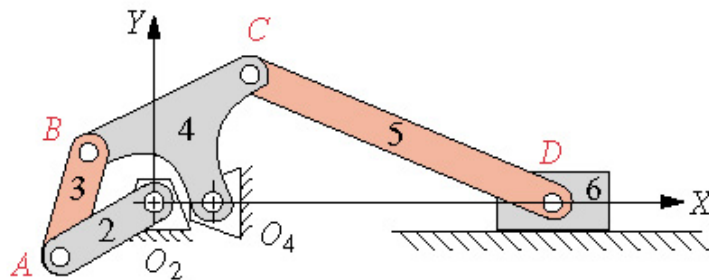
(c) Dual crosshead mechanism



(d) Sixbar linkage

Exercícios Recomendados

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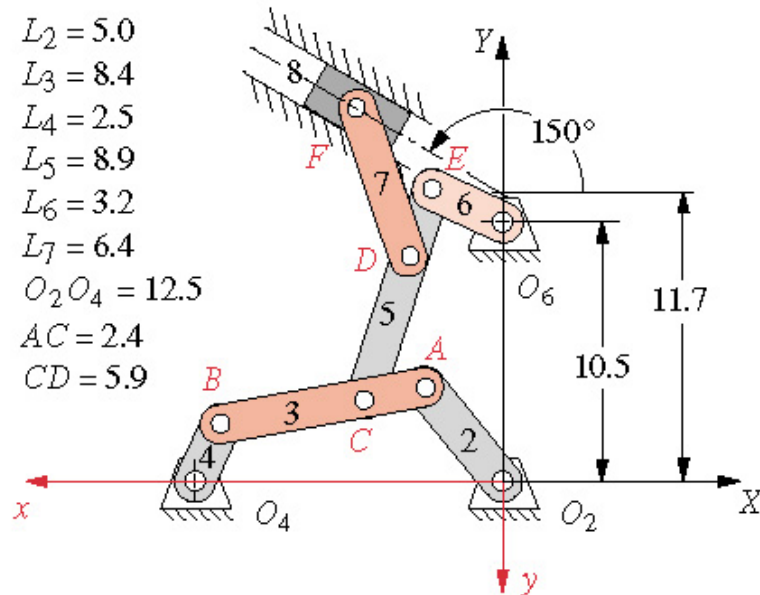


$$L_2 = 5 \quad L_3 = 5 \quad L_5 = 15 \quad BC = 8$$

$$O_2O_4 = 2.5 \quad O_4B = 6 \quad O_4C = 6$$

(e) Drag link slider-crank

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$$L_2 = 5.0$$

$$L_3 = 8.4$$

$$L_4 = 2.5$$

$$L_5 = 8.9$$

$$L_6 = 3.2$$

$$L_7 = 6.4$$

$$O_2O_4 = 12.5$$

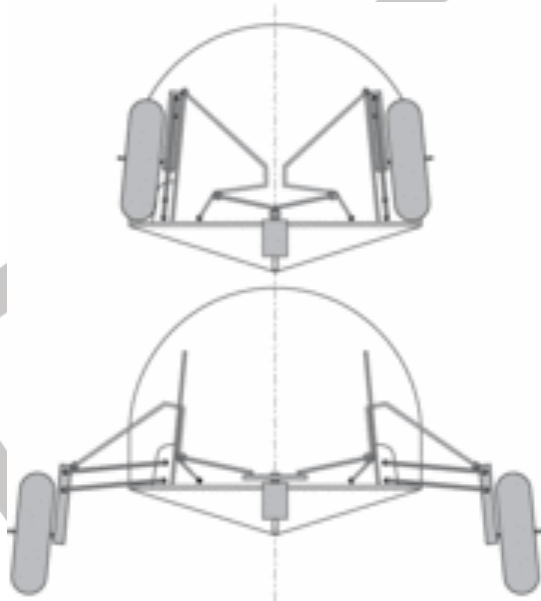
$$AC = 2.4$$

$$CD = 5.9$$

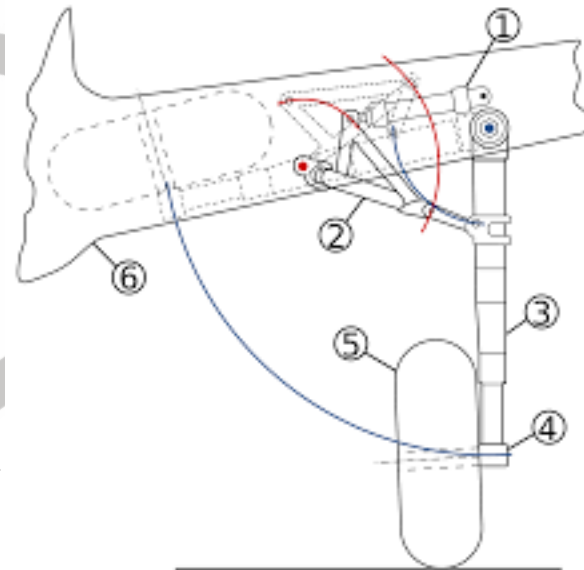
(f) Eightbar mechanism

Exercícios Recomendados

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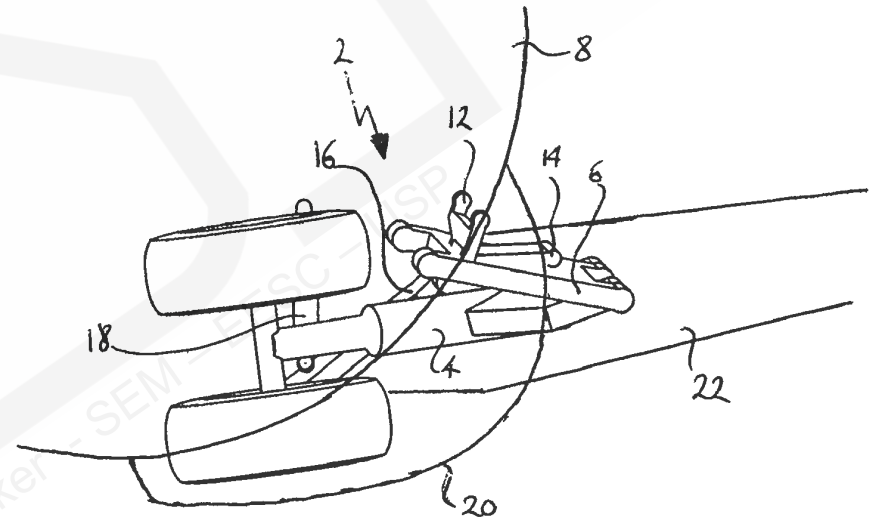
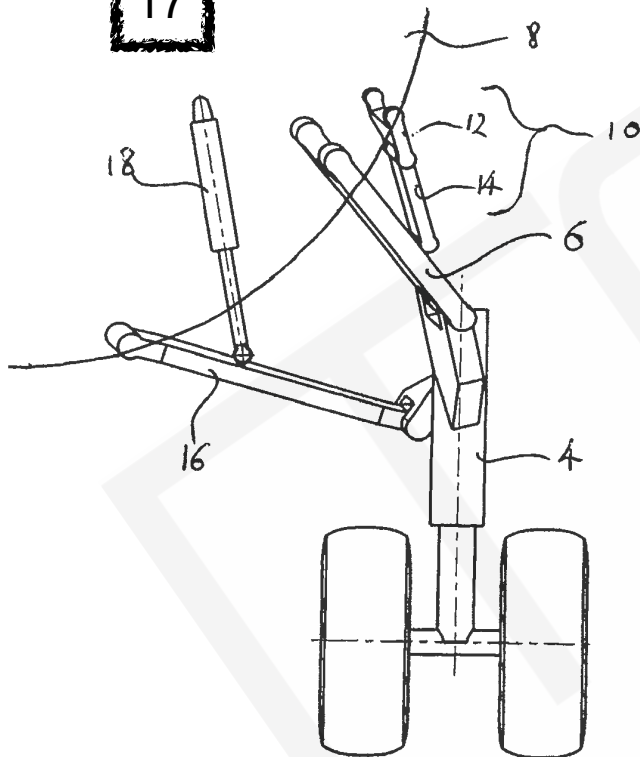
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Exercícios Recomendados

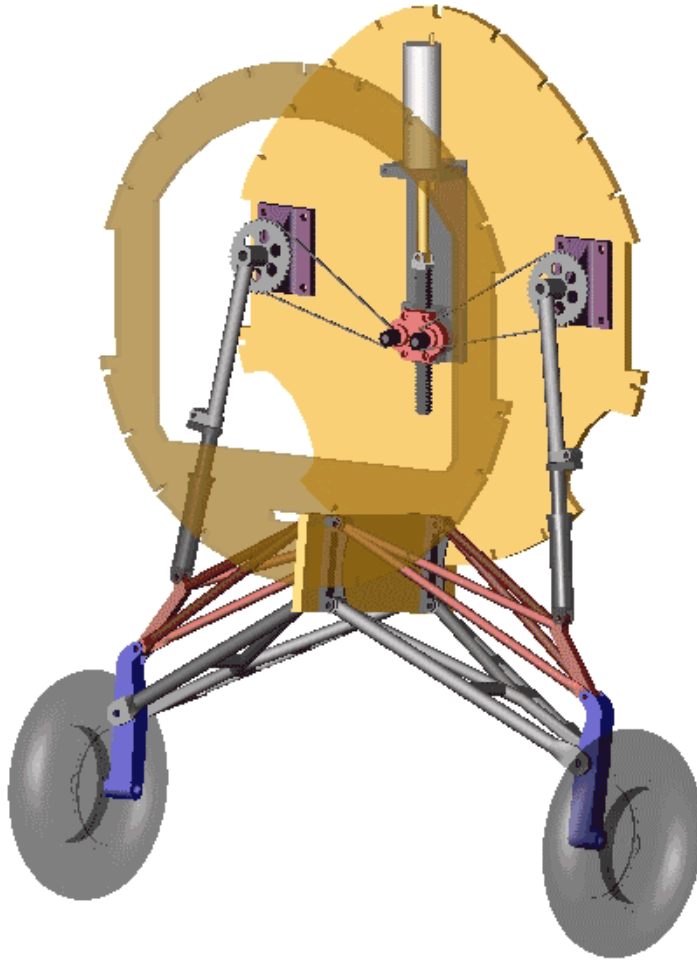
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Exercícios Recomendados

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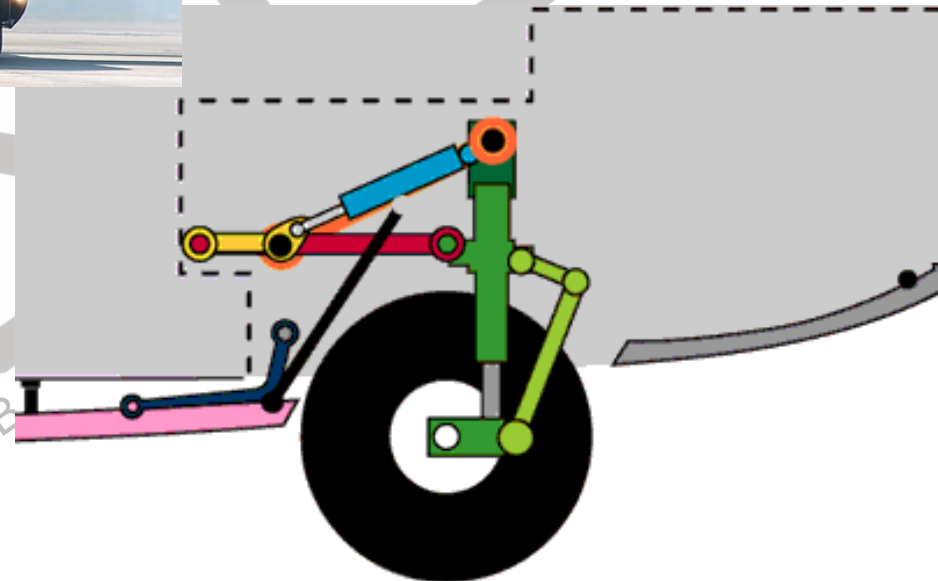
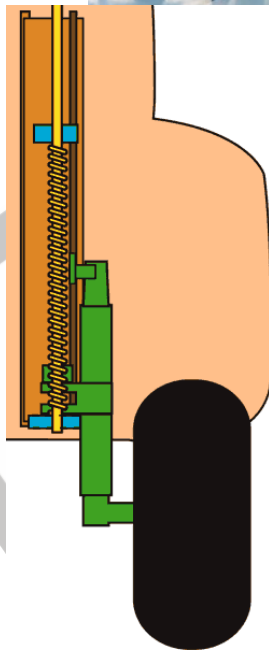


Grumman F4F Wildcat

Exercícios Recomendados

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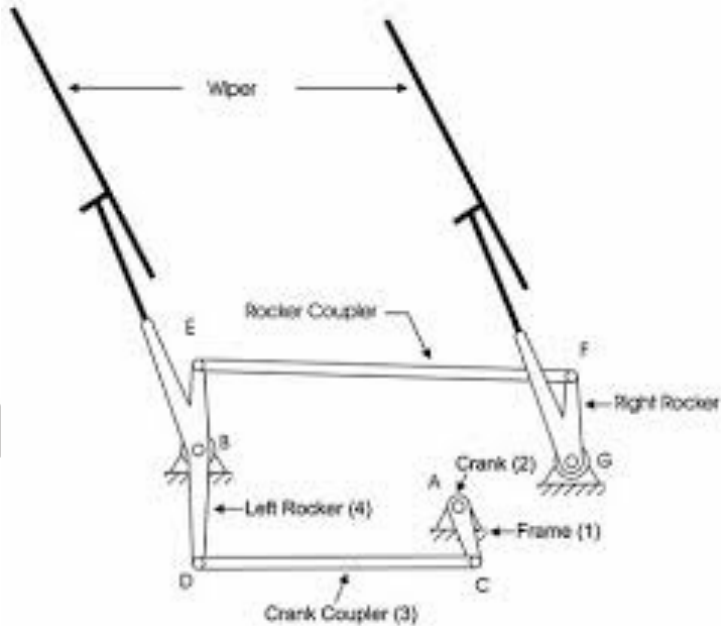
Hercules C-130



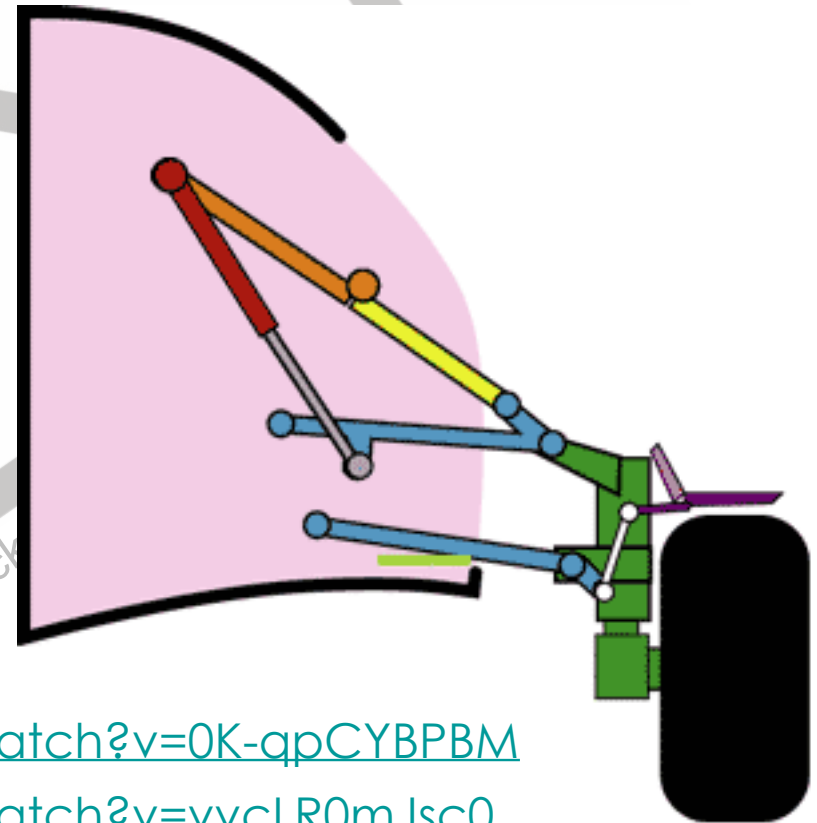
http://bemil.chosun.com/nbrd/bbs/view.html?b_bbs_id=10044&pn=0&num=75828

Exercícios Recomendados

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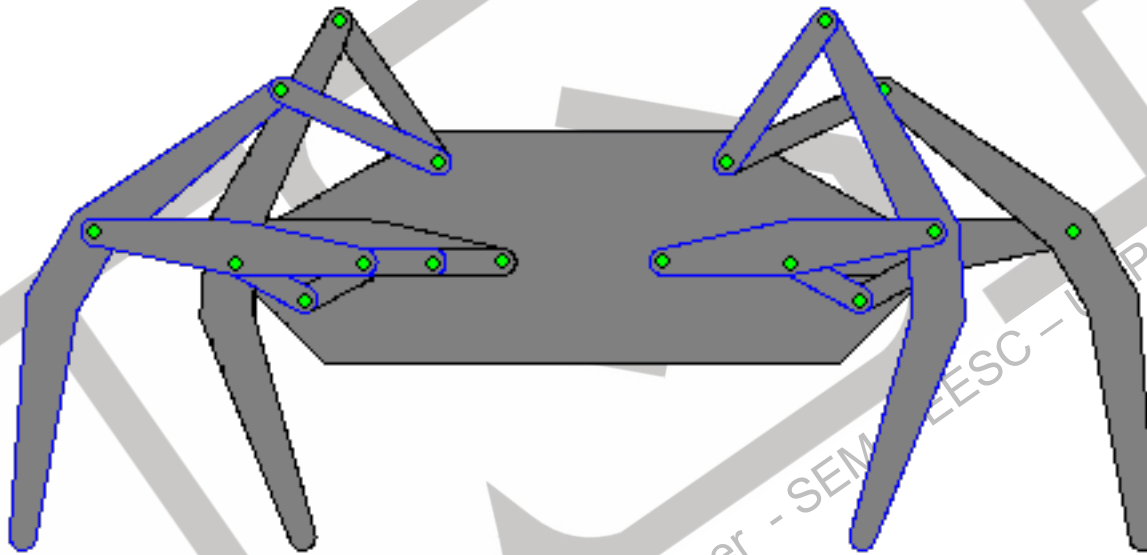


<https://www.youtube.com/watch?v=0K-qpCYBPBM>

<https://www.youtube.com/watch?v=vvcLR0mJsc0>

Exercícios Recomendados

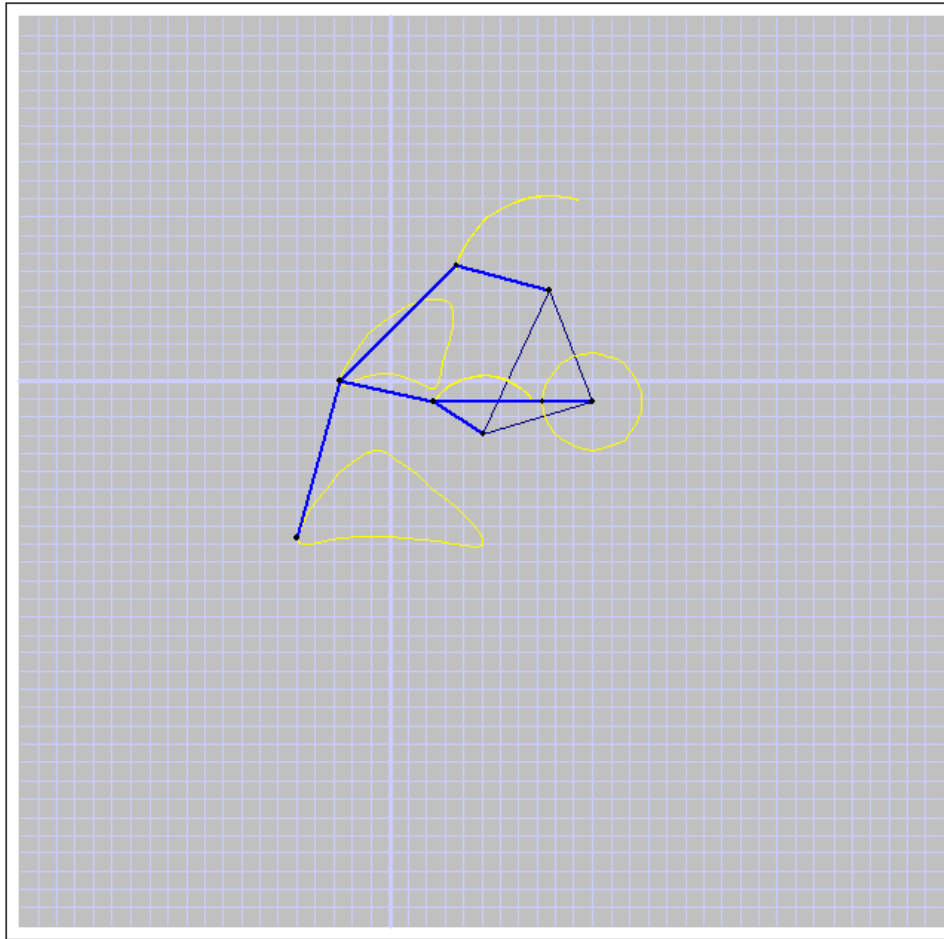
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Animation of Klann linkage in motion

Mechanical Spider

Exercícios Recomendados

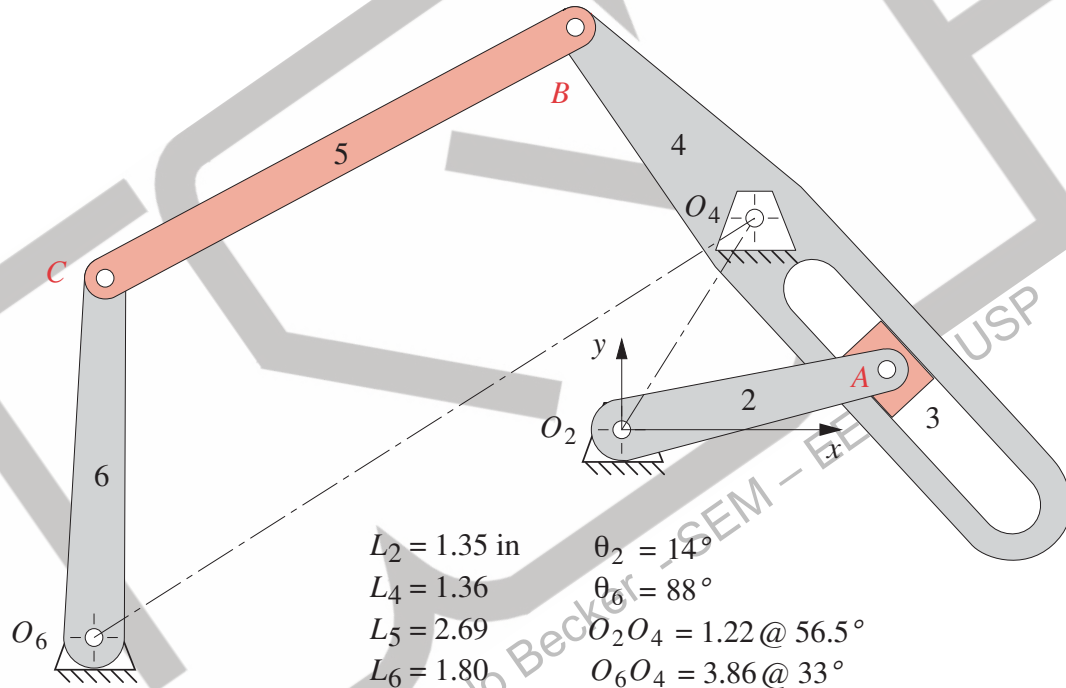


Mechanical Spider

<http://www.mechanicalspider.com/elements/enable001.html>

Exercícios Recomendados

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Velocidade Relativa

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Exemplos

- Exercícios Recomendados

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- Shigley, J.E. e Uicker, J.J., 1995, "*Theory of Machines and Mechanisms*".
- MABIE, H.H., OCVIRK, F.W. "Mecanismos e dinâmica das máquinas".
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- Notas de Aula