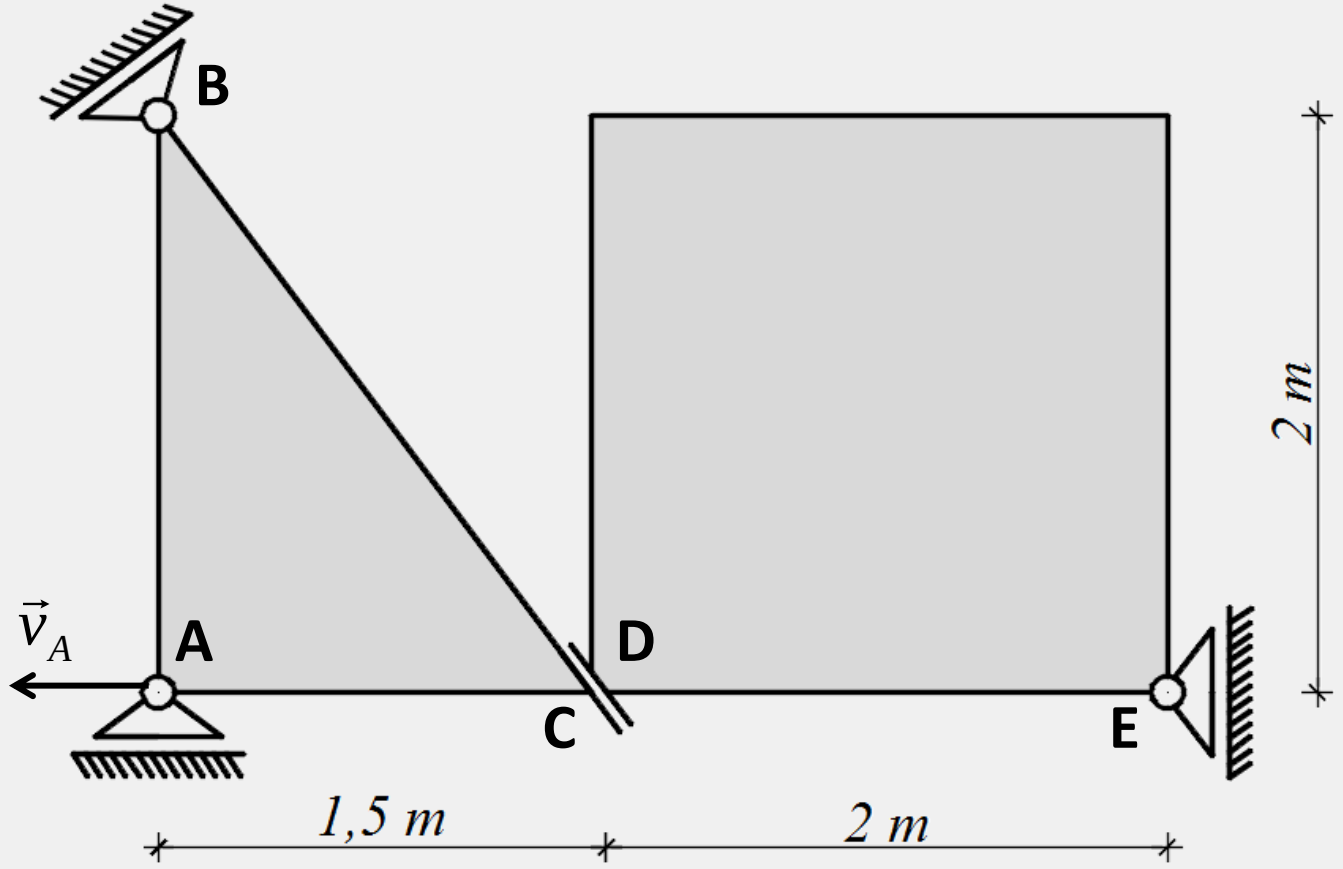
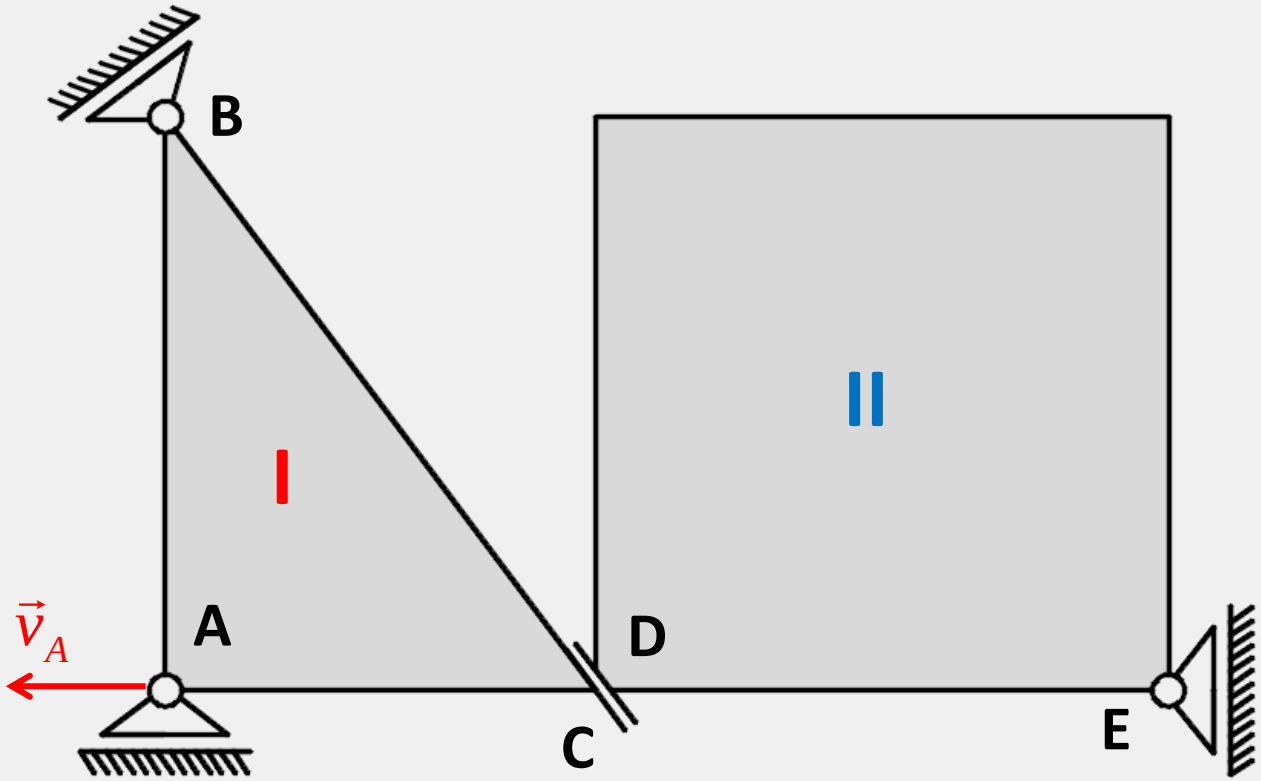
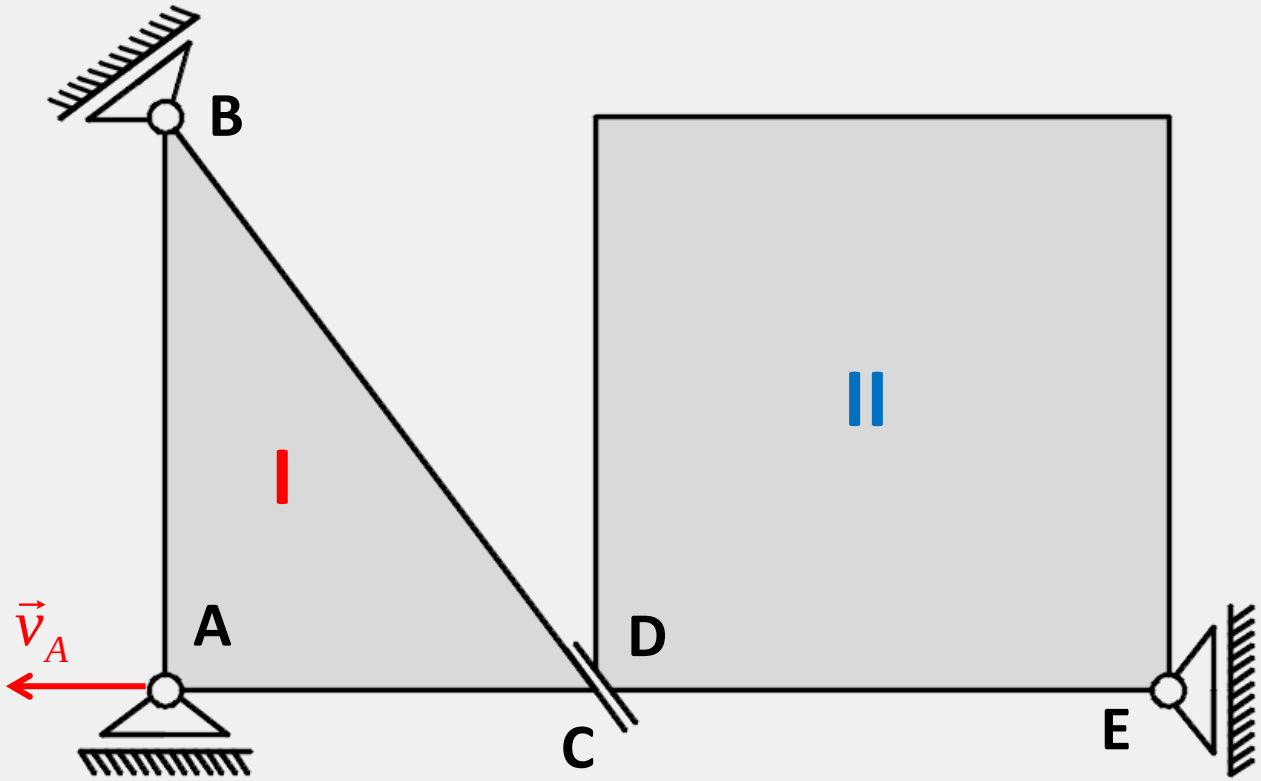
ZA PRIKAZANI POLOŽAJ MEHANIZMA POZNATA JE BRZINA TOČKE A: $v_A = 4\ m/s = const.$

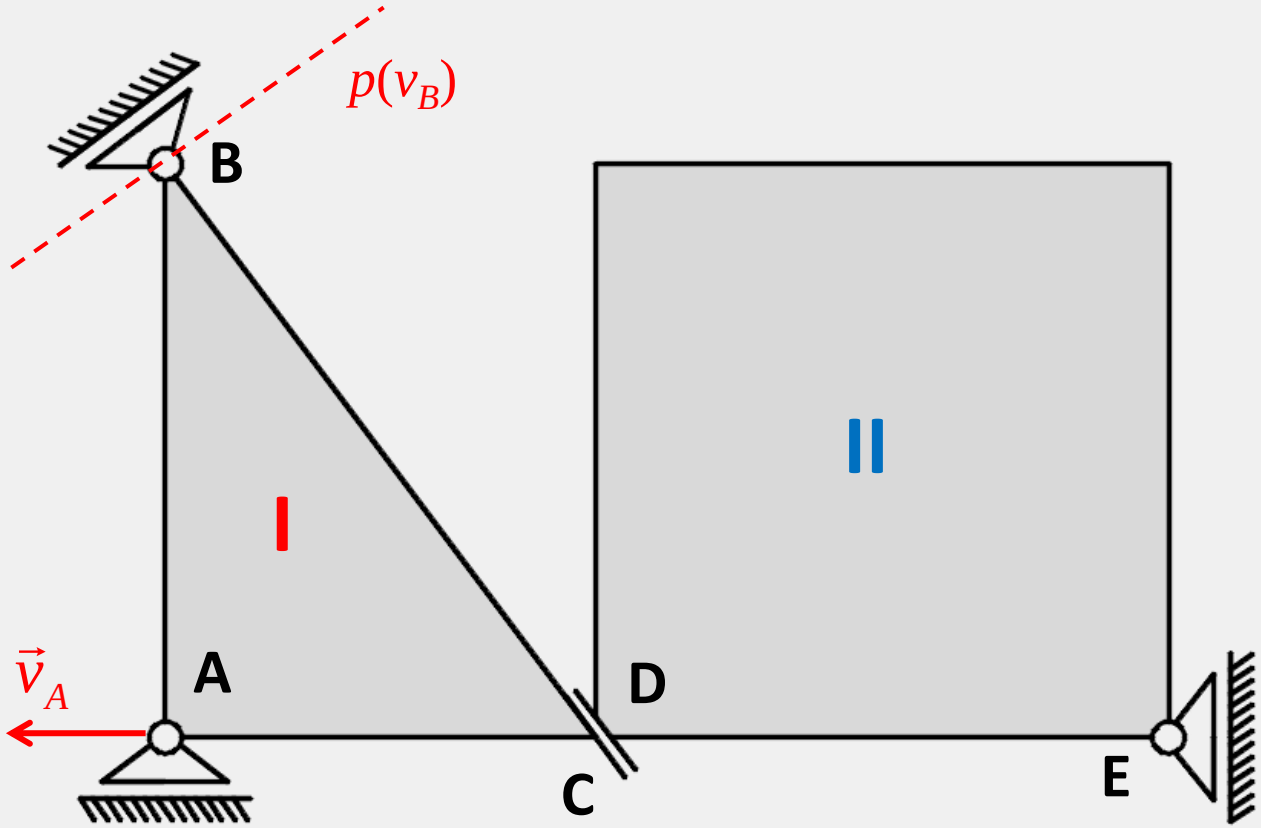
TREBA ODREDITI IZNOSE I VEKTORE BRZINA I UBRZANJA SVIH OZNAČENIH TOČAKA MEHANIZMA.




B
I
II
A
D
C
E
$\vec{v}_A$

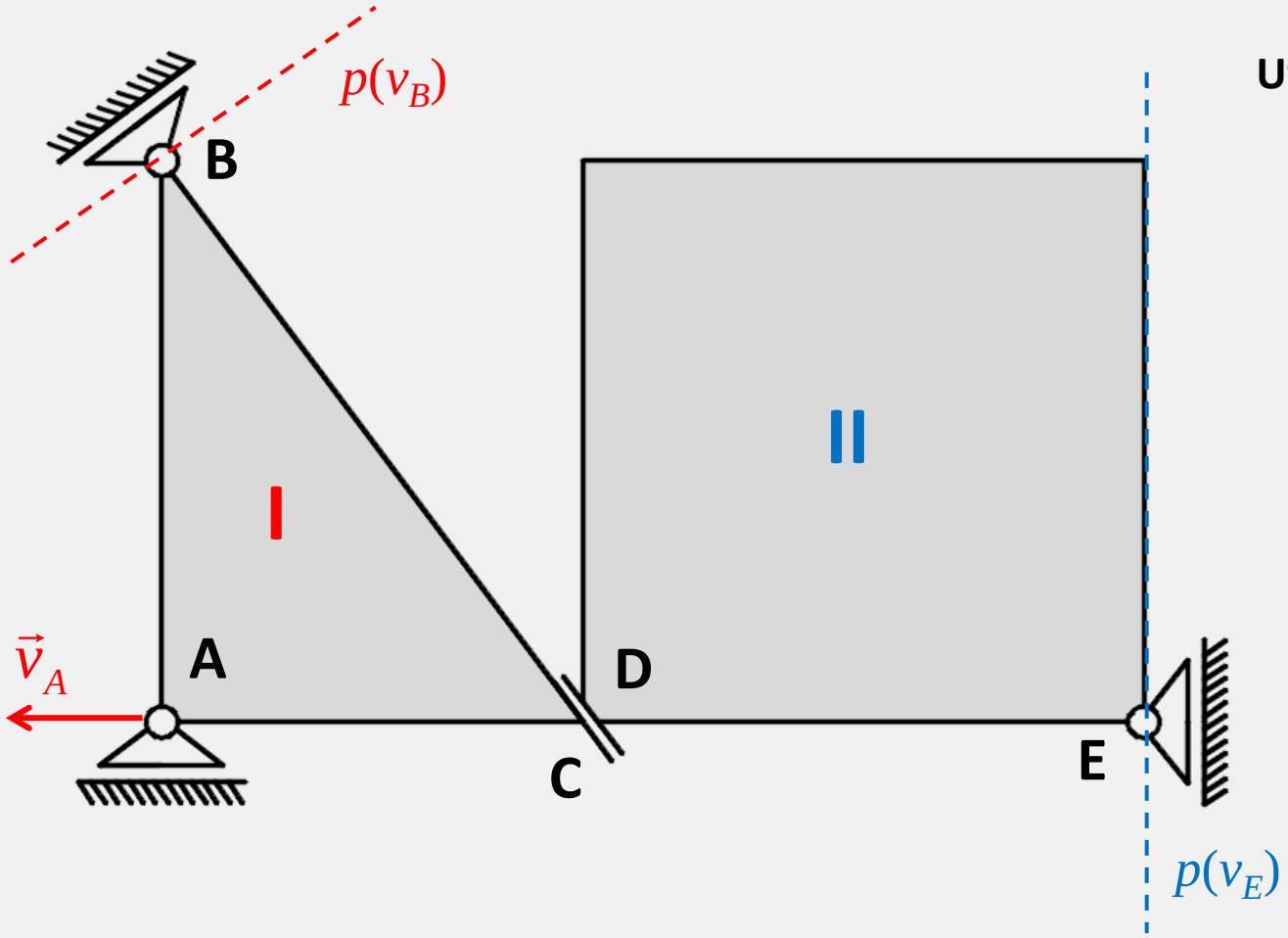
Uvjeti spojeva s podlogom





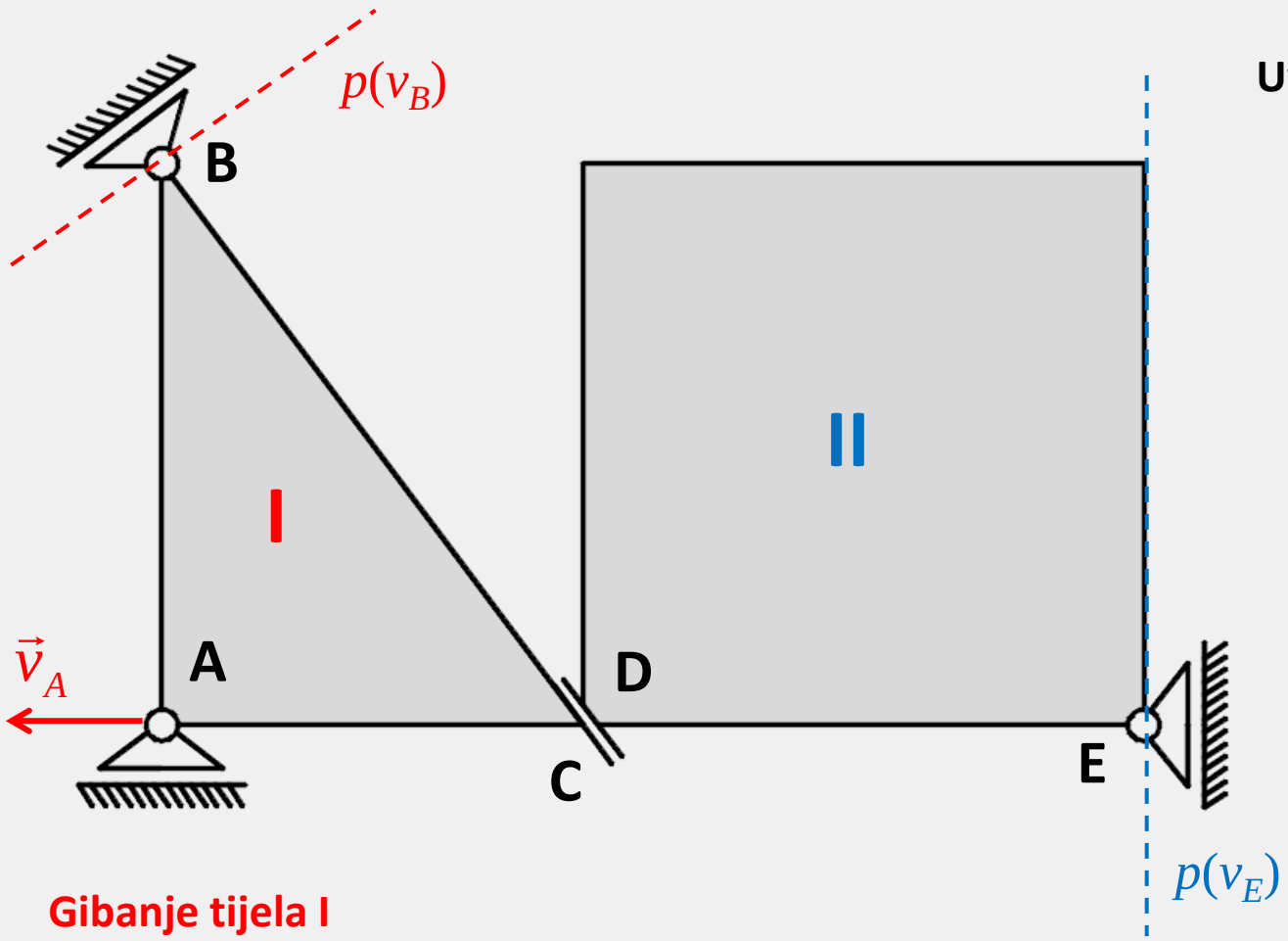
Uvjeti spojeva s podlogom

$p(v_B)$



Uvjeti spojeva s podlogom

$p(v_B)$ $p(v_E)$

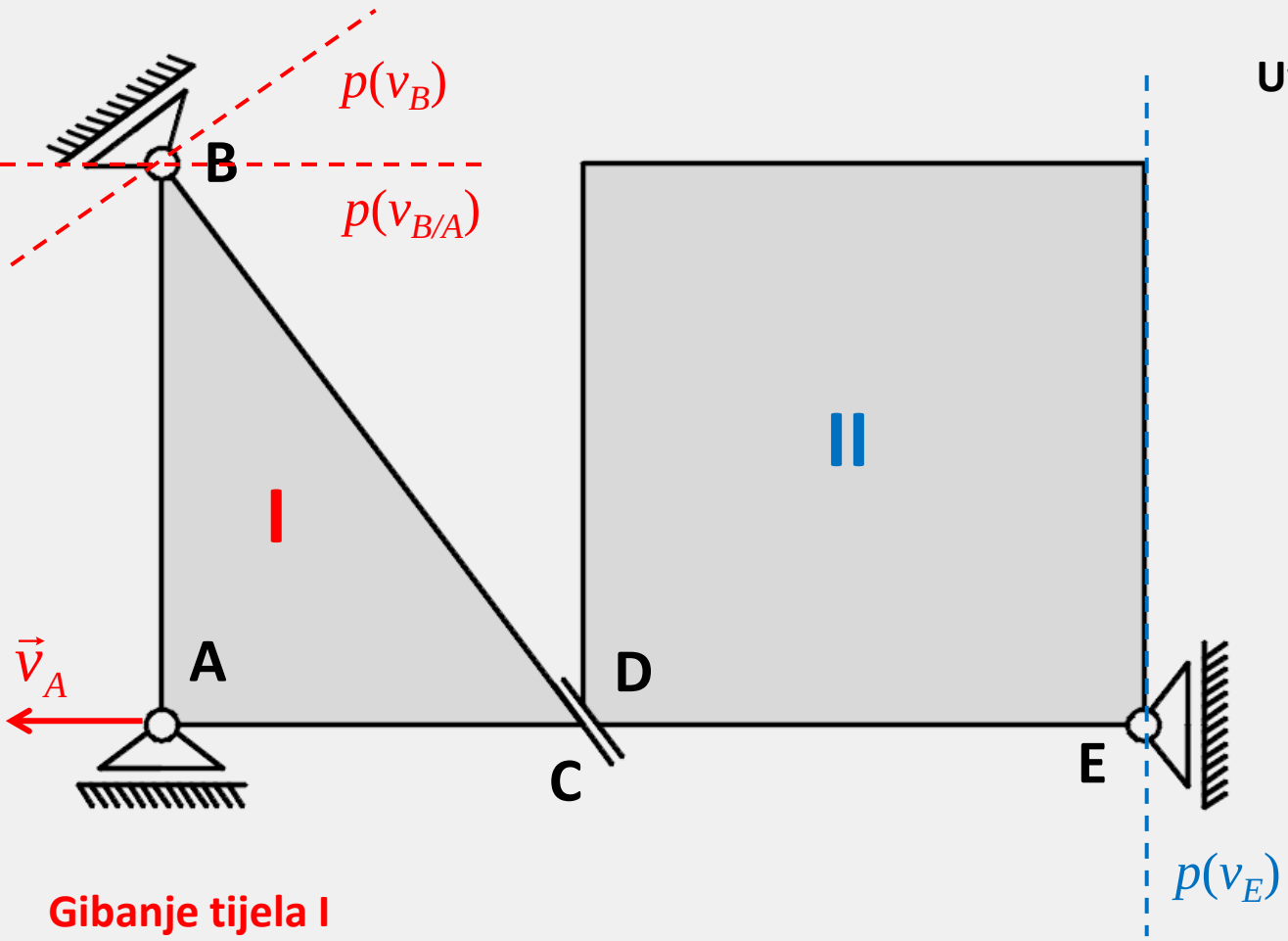


Uvjeti spojeva s podlogom

$p(v_B)$ $p(v_E)$

Gibanje tijela I

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



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$p(v_B)$ $p(v_E)$

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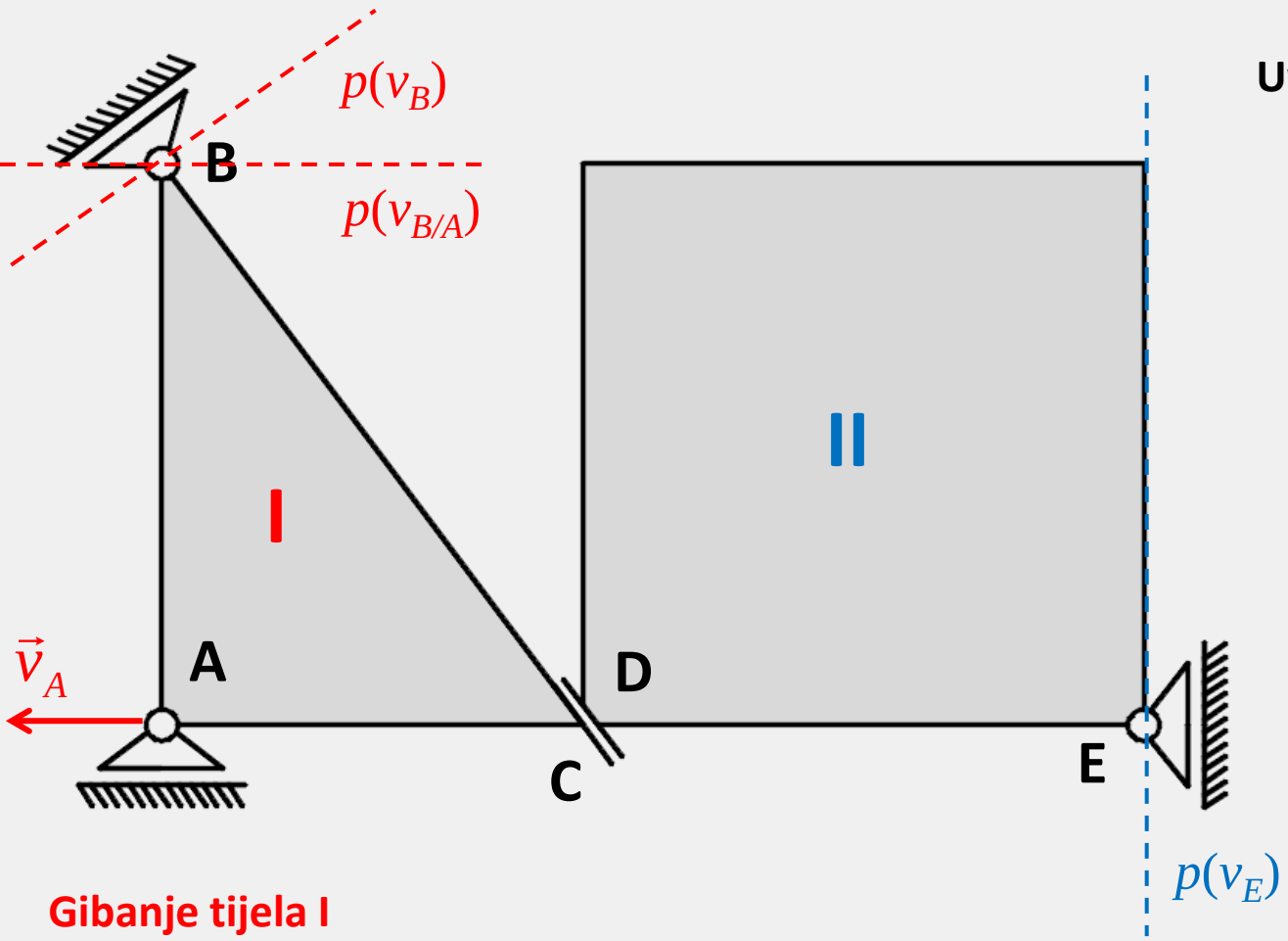
$\vec{v}_B = \vec{v}_A + \vec{v}_{B/A}$ $\vec{v}_{B/A} \perp \overline{AB}$



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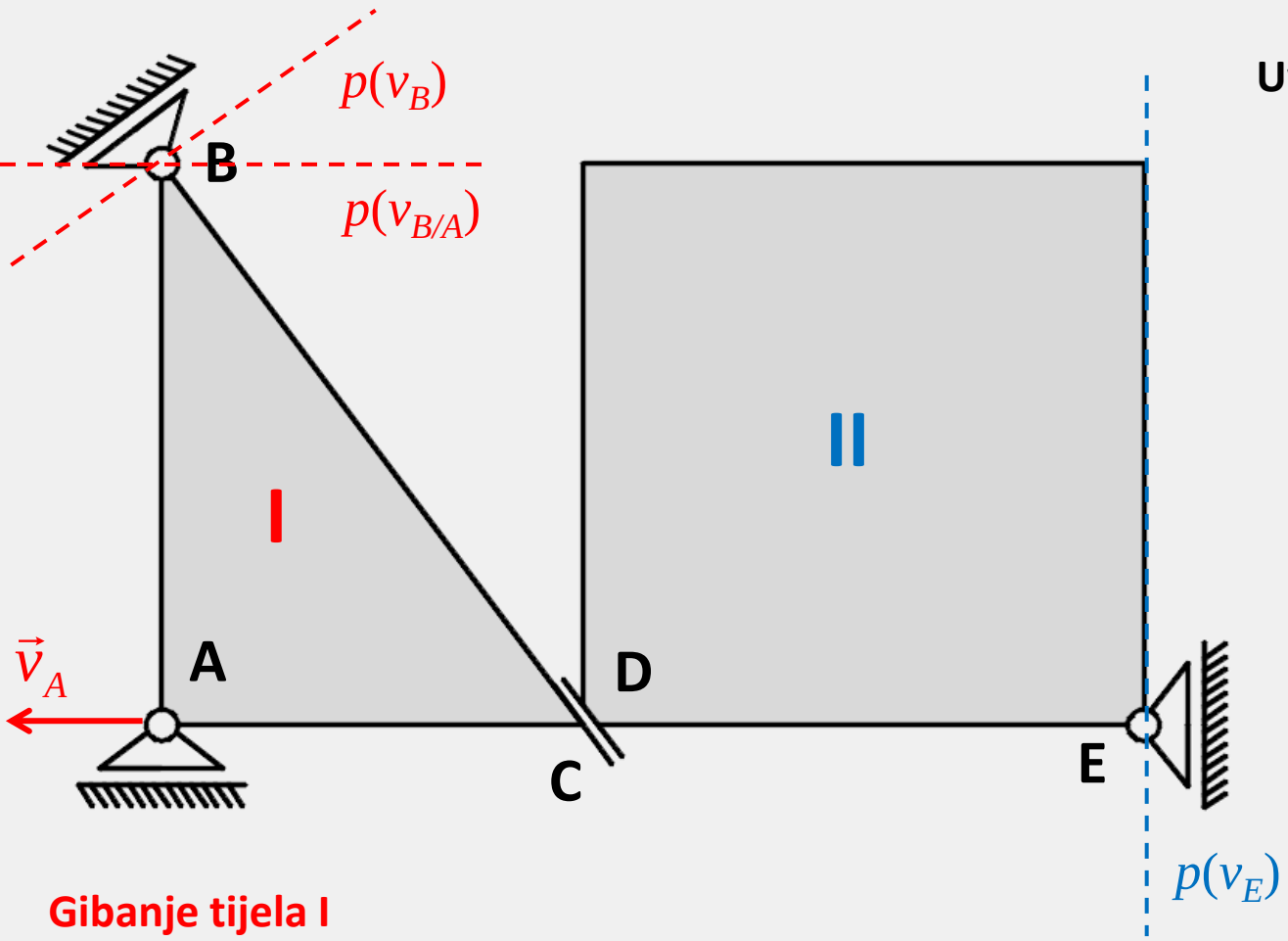

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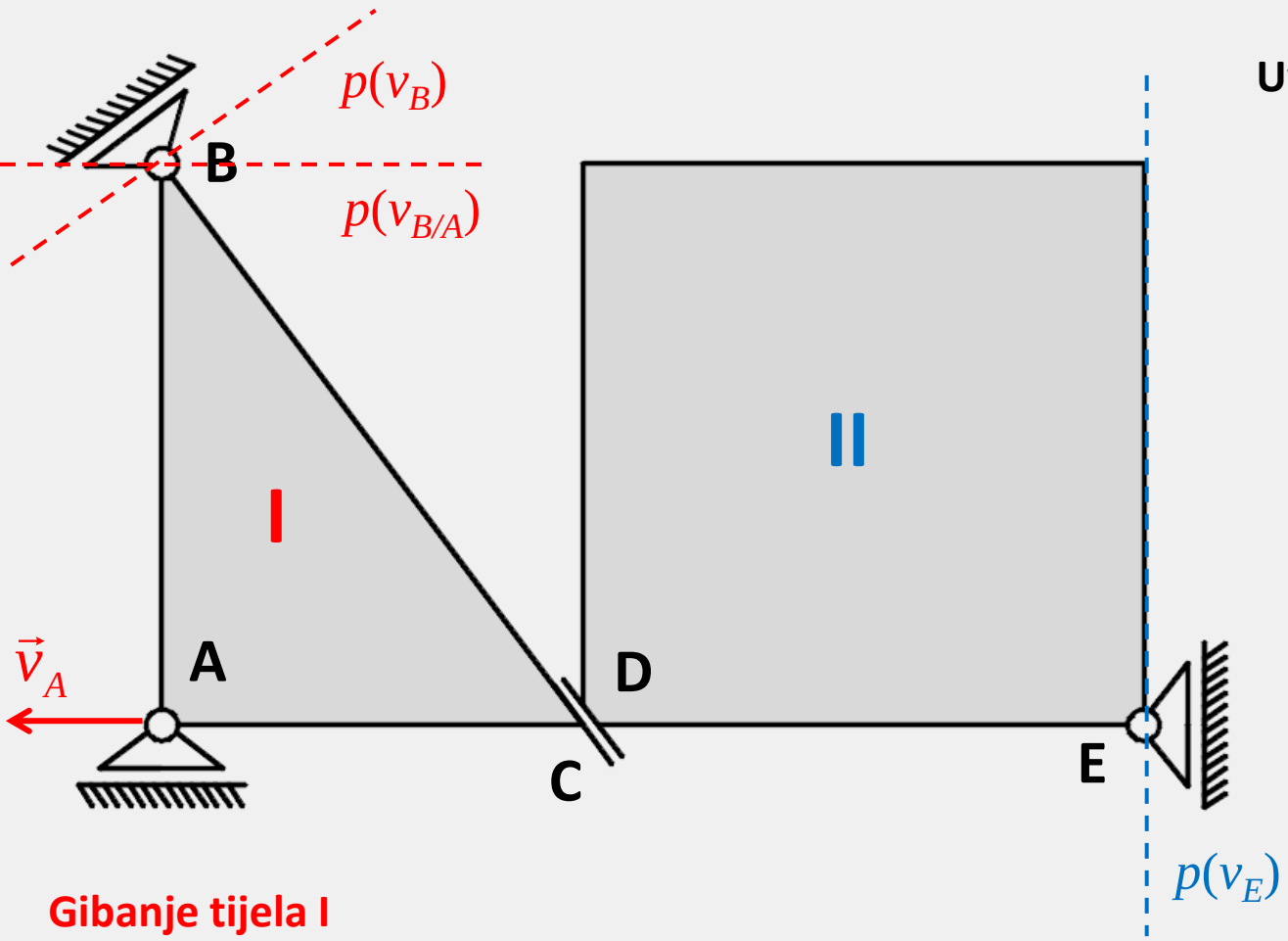

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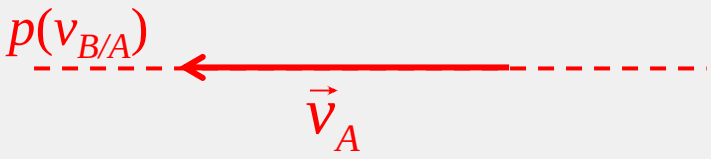

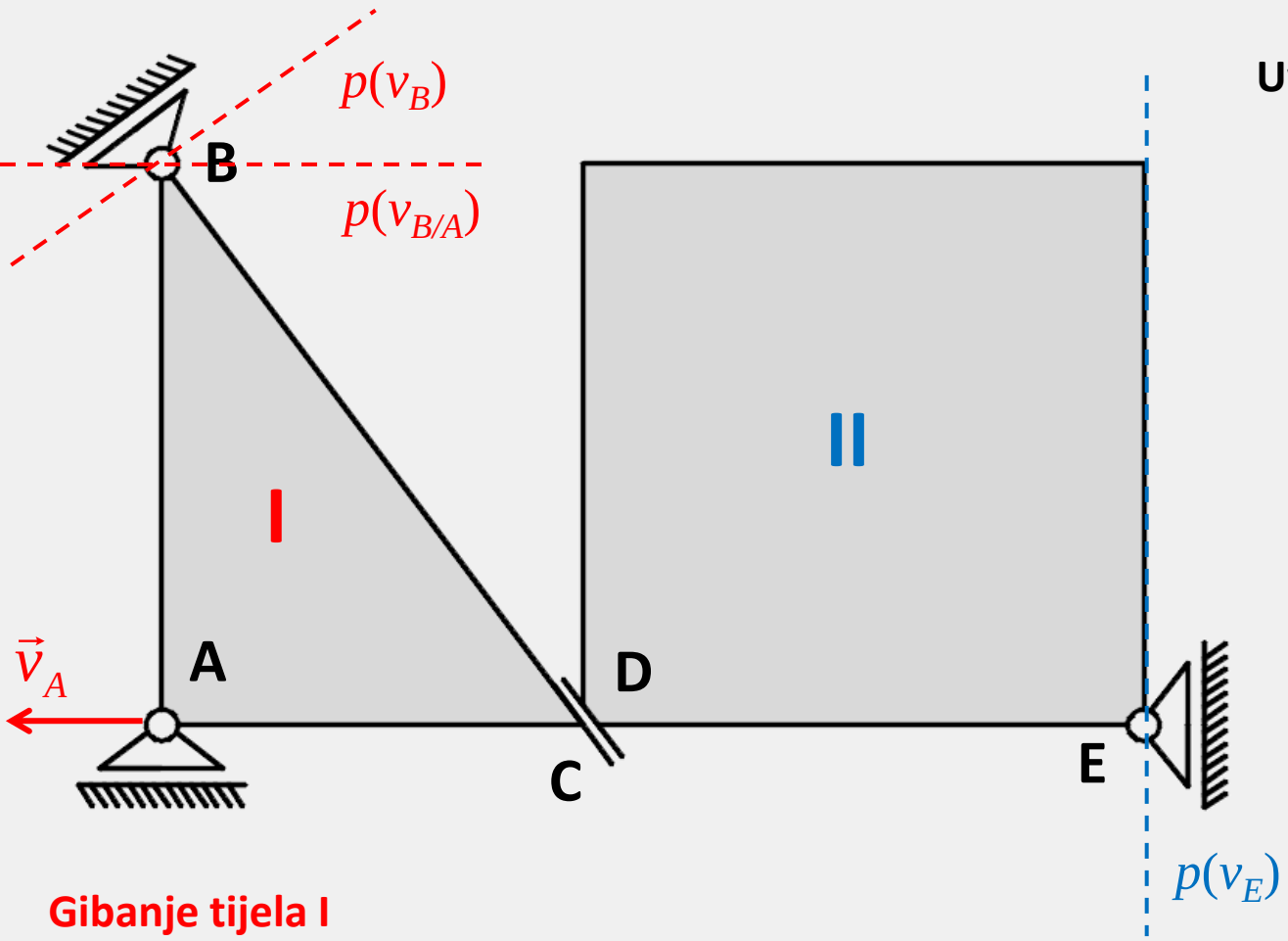

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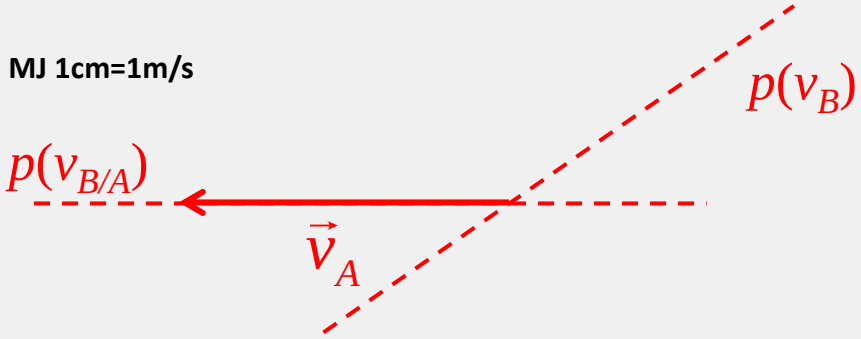

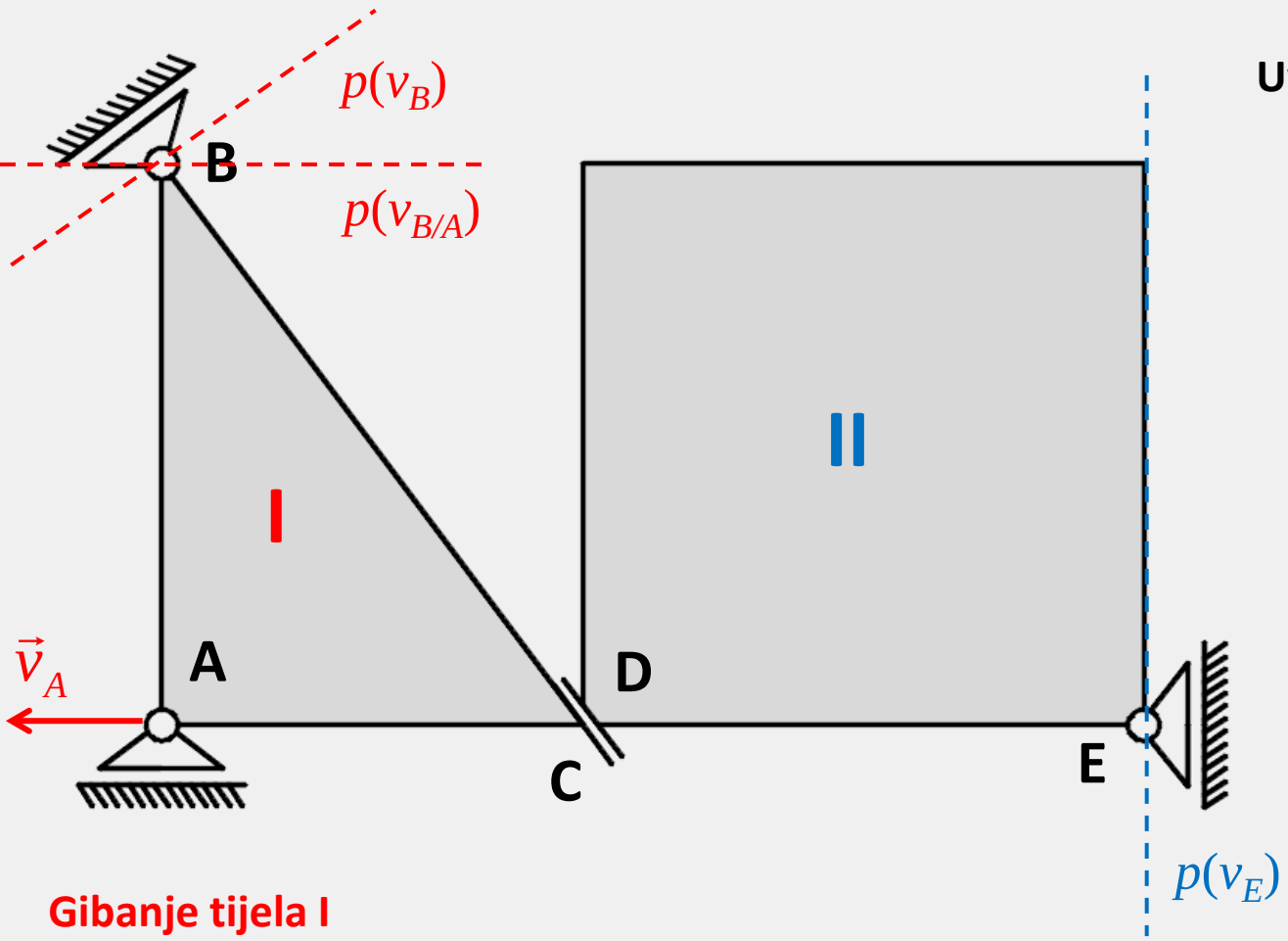

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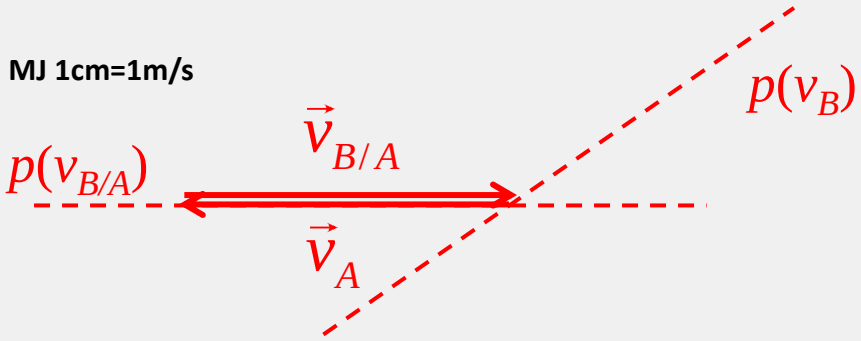

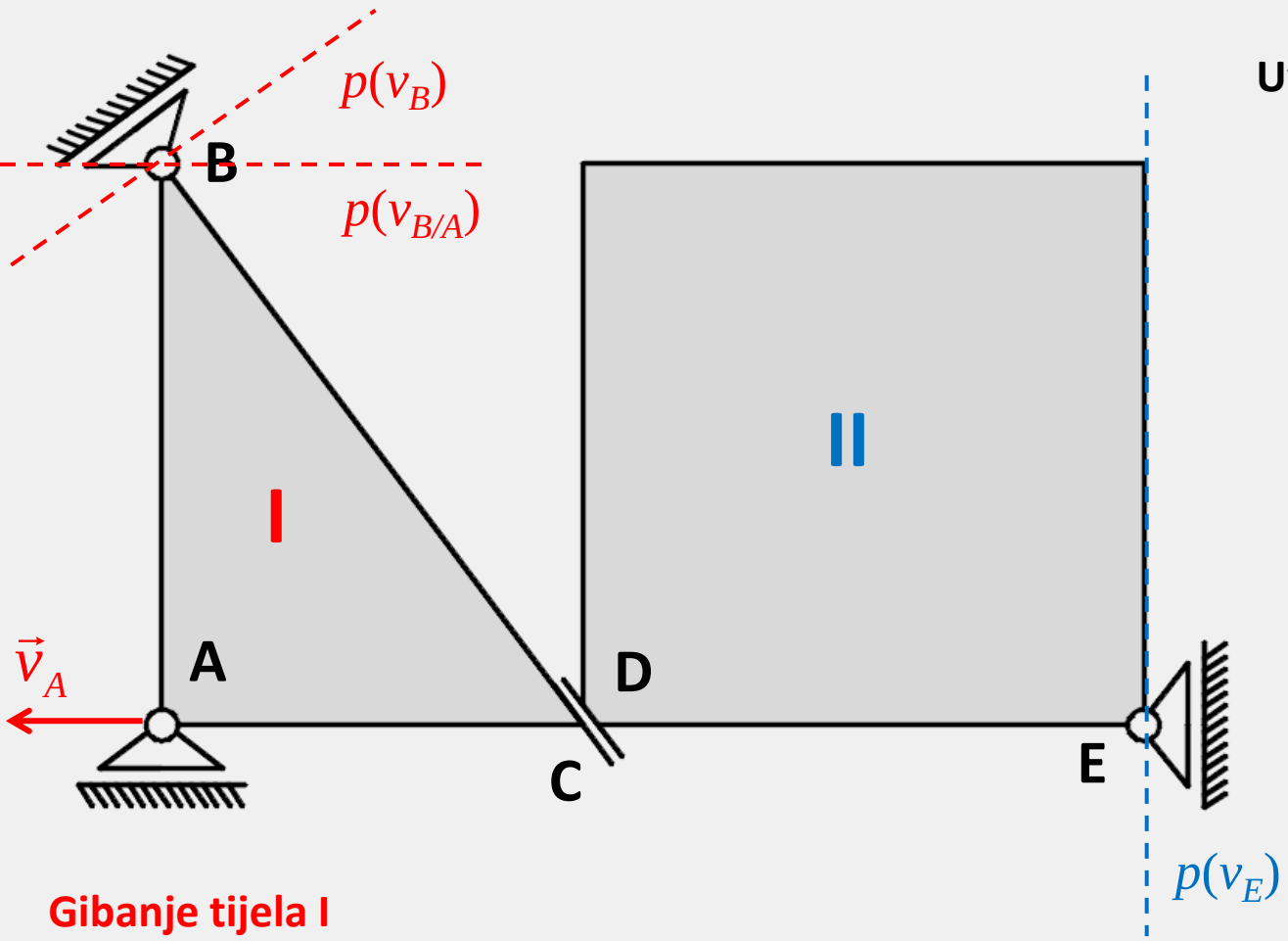

Uvjeti spojeva s podlogom

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Gibanje tijela I

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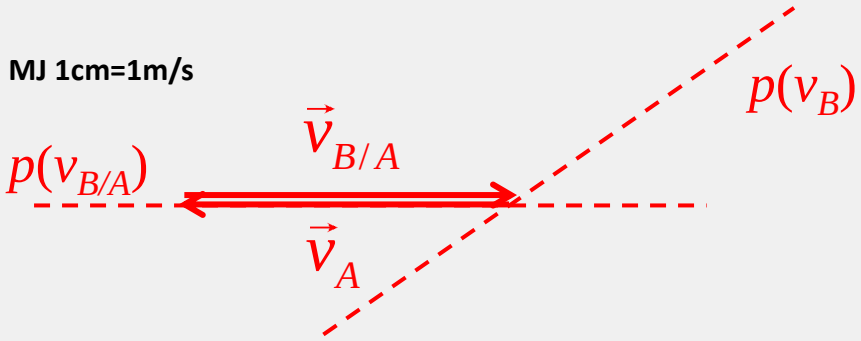
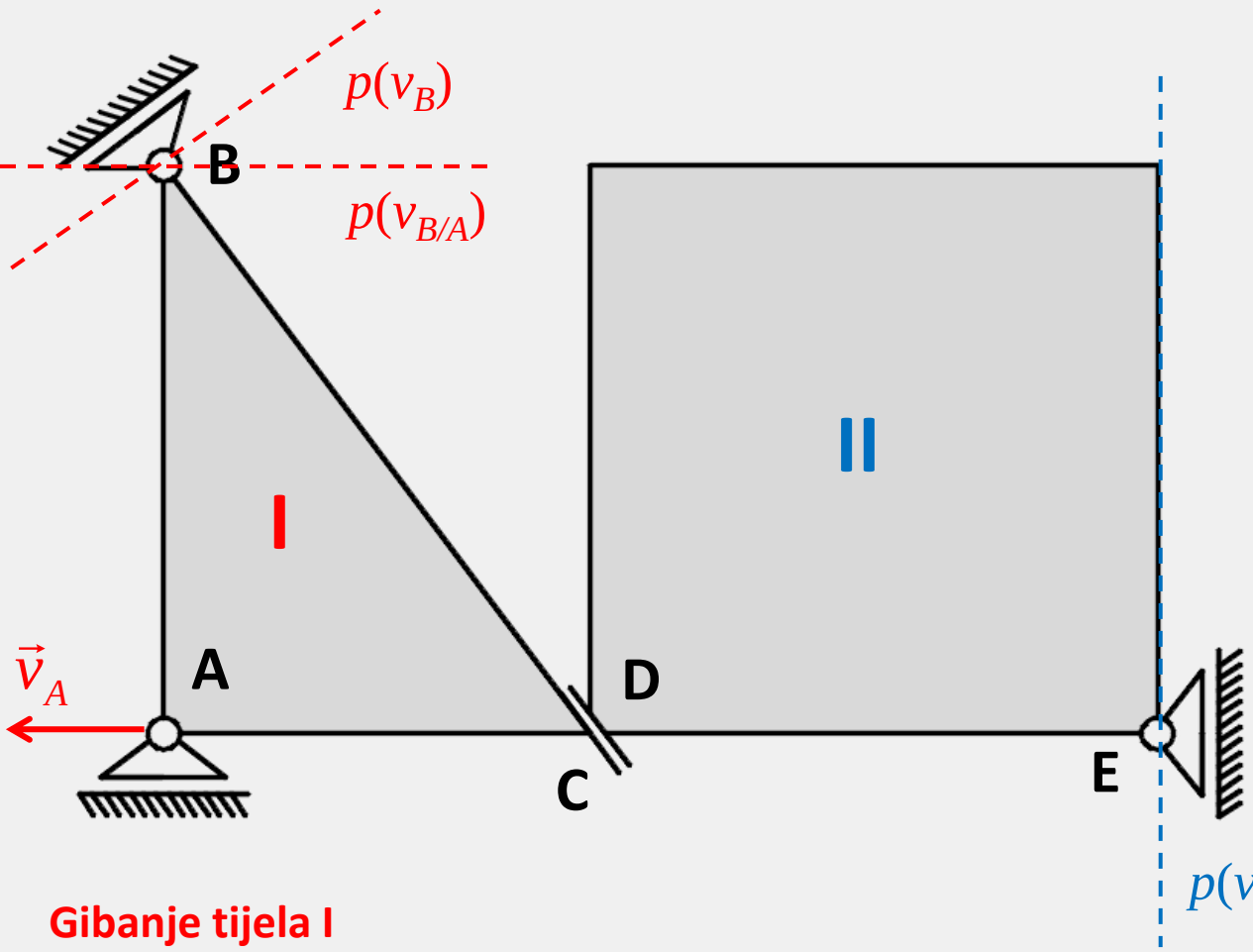
očitano: $v_B = 0$

$v_{B/A} = 4cm = 4\ m/s$

MJ 1cm=1m/s





Uvjeti spojeva s podlogom

$p(v_B)$ $p(v_E)$

Gibanje tijela I

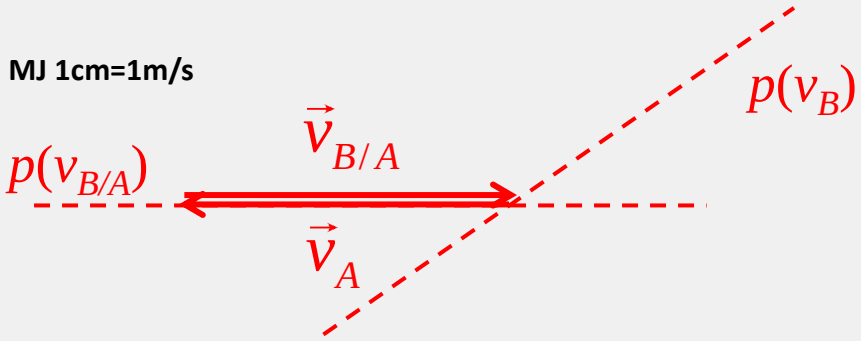
$\vec{v}_B = \vec{v}_A + \vec{v}_{B/A}$ $\vec{v}_{B/A} \perp \overline{AB}$

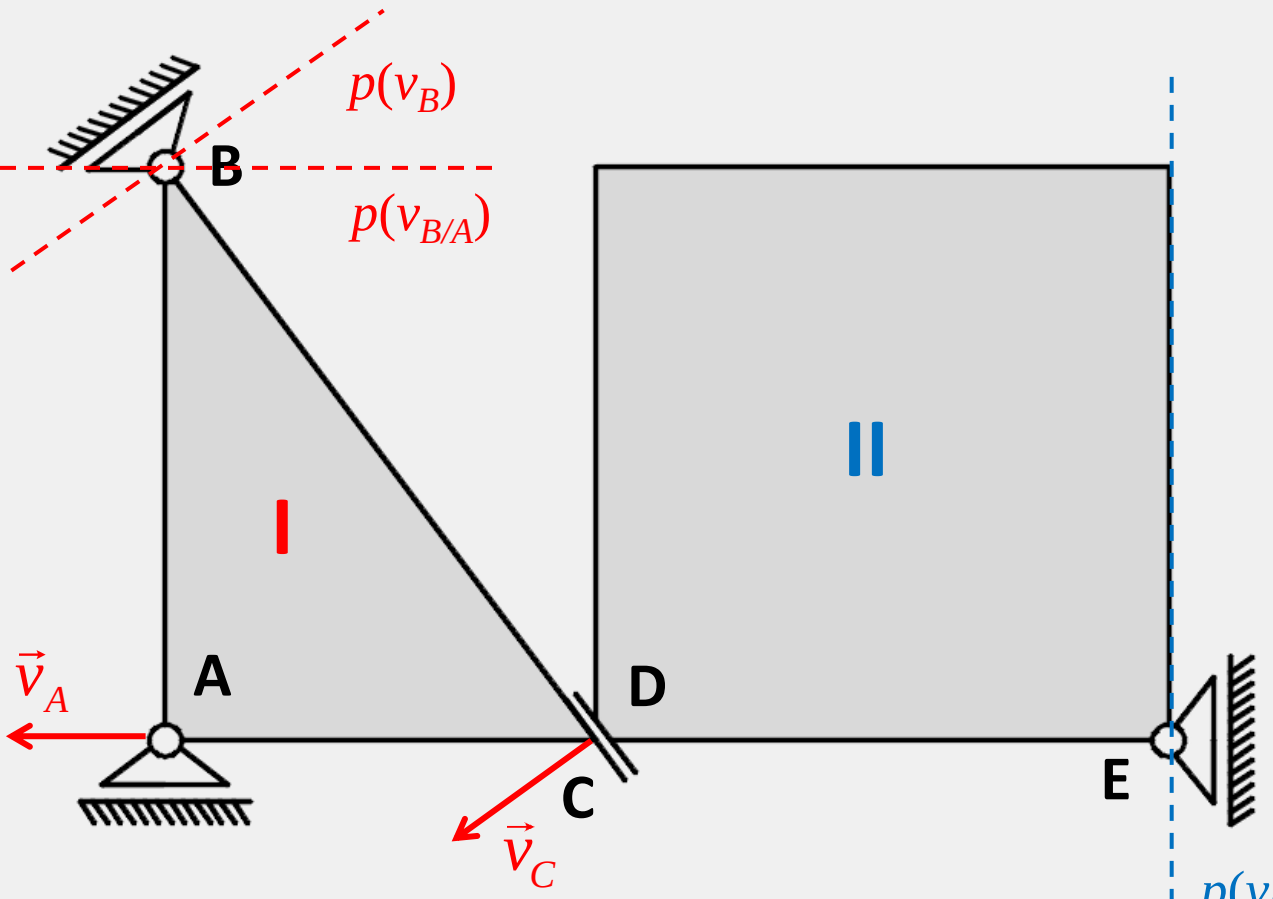
očitano: $v_B = 0$

$v_{B/A} = 4cm = 4\ m/s$

$\omega_I = \frac{v_{B/A}}{\overline{AB}} = \frac{4}{2} = 2\ r/s$ $\vec{\omega}_I = -2\vec{k}$

MJ 1cm=1m/s





Uvjeti spojeva s podlogom

$p(v_B)$ $p(v_E)$

Gibanje tijela I

$\vec{v}_B = \vec{v}_A + \vec{v}_{B/A}$ $\vec{v}_{B/A} \perp \overline{AB}$

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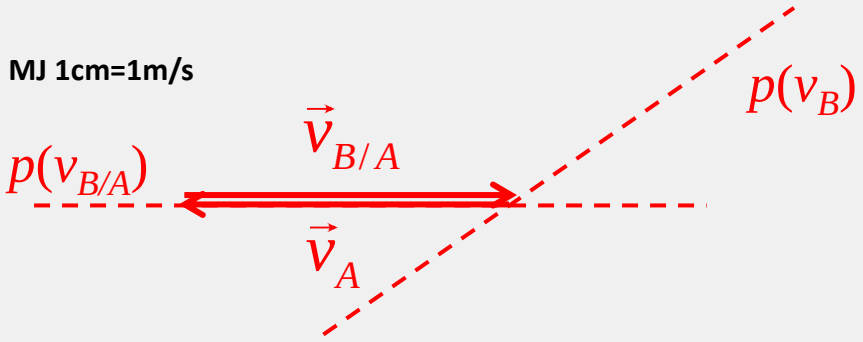
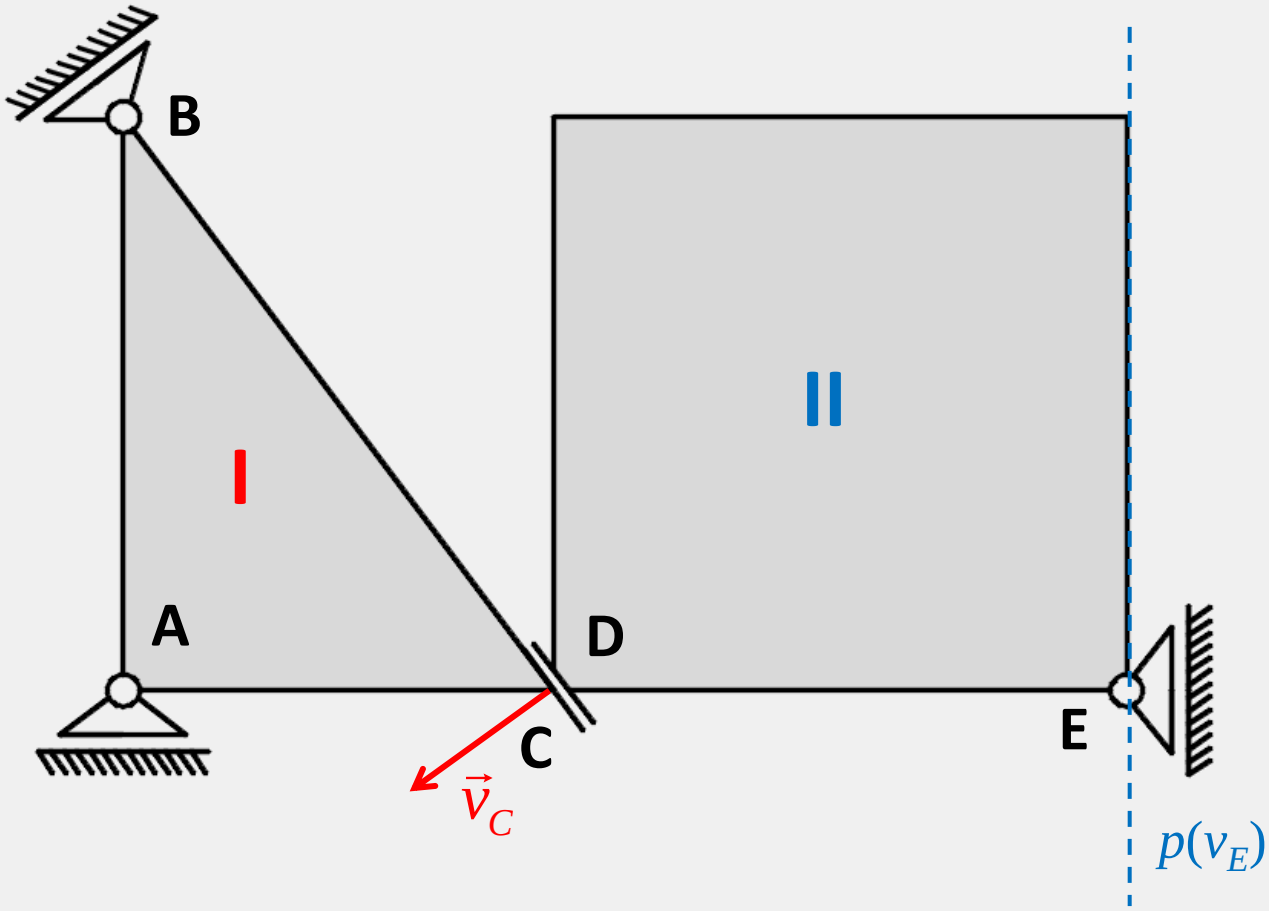


$\vec{v}_C = \vec{v}_A + \vec{v}_{C/A} = -4\vec{i} - 1{,}5 \cdot 2\vec{j} = -4\vec{i} - 3\vec{j}$

$v_C = 5\ m/s$


B
I
II
A
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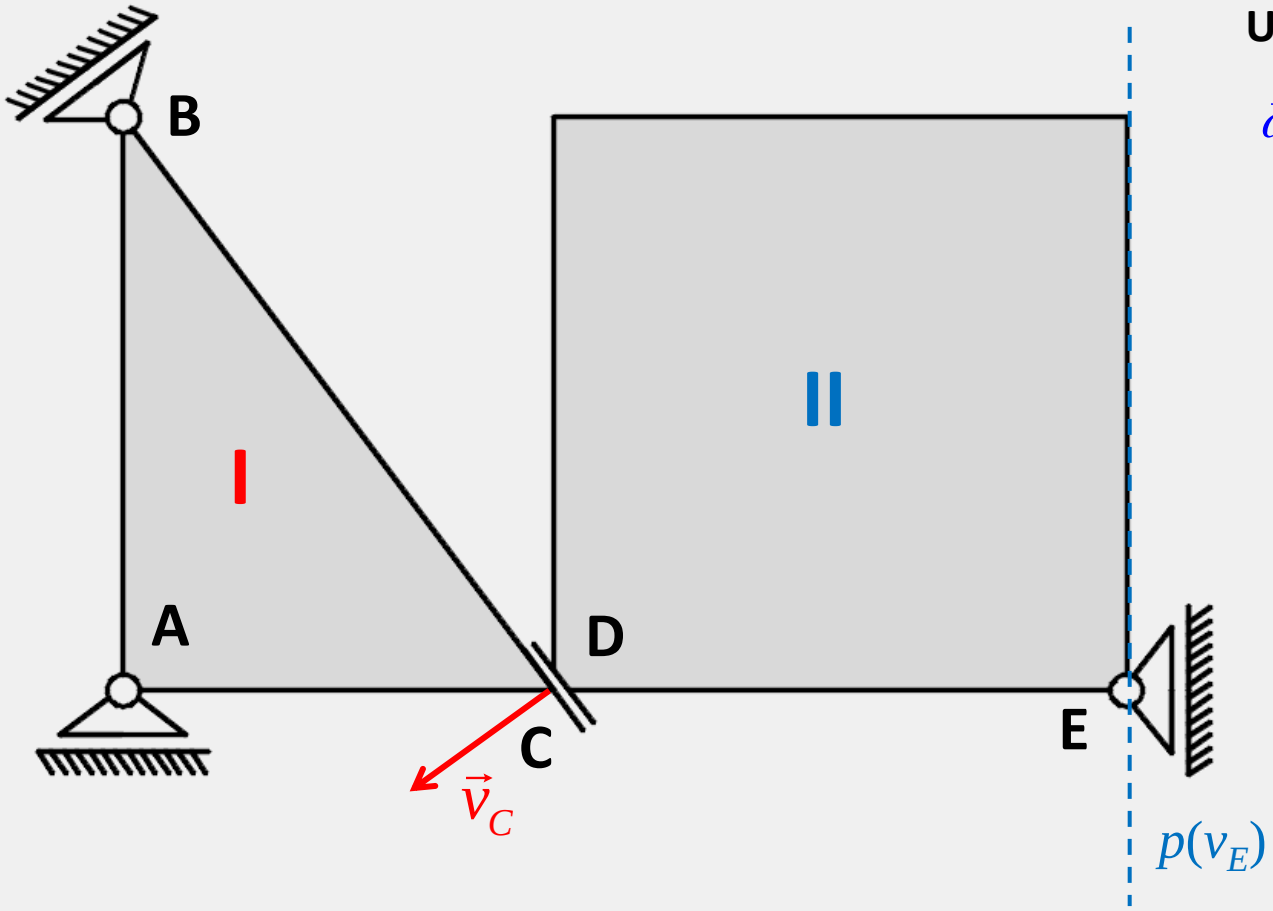
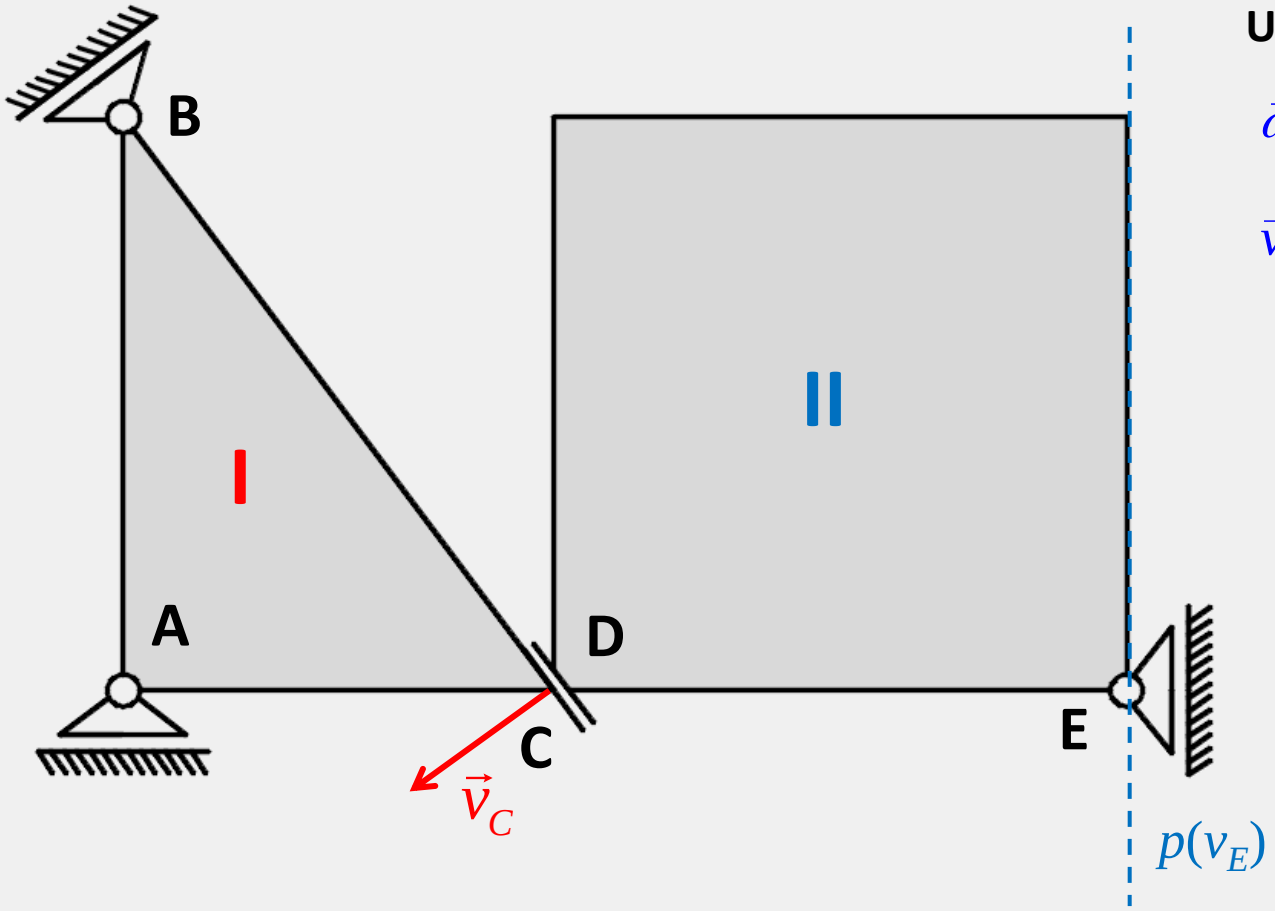
E
$\vec{v}_C$
$p(v_E)$



Uvjeti spoja tijela I i II

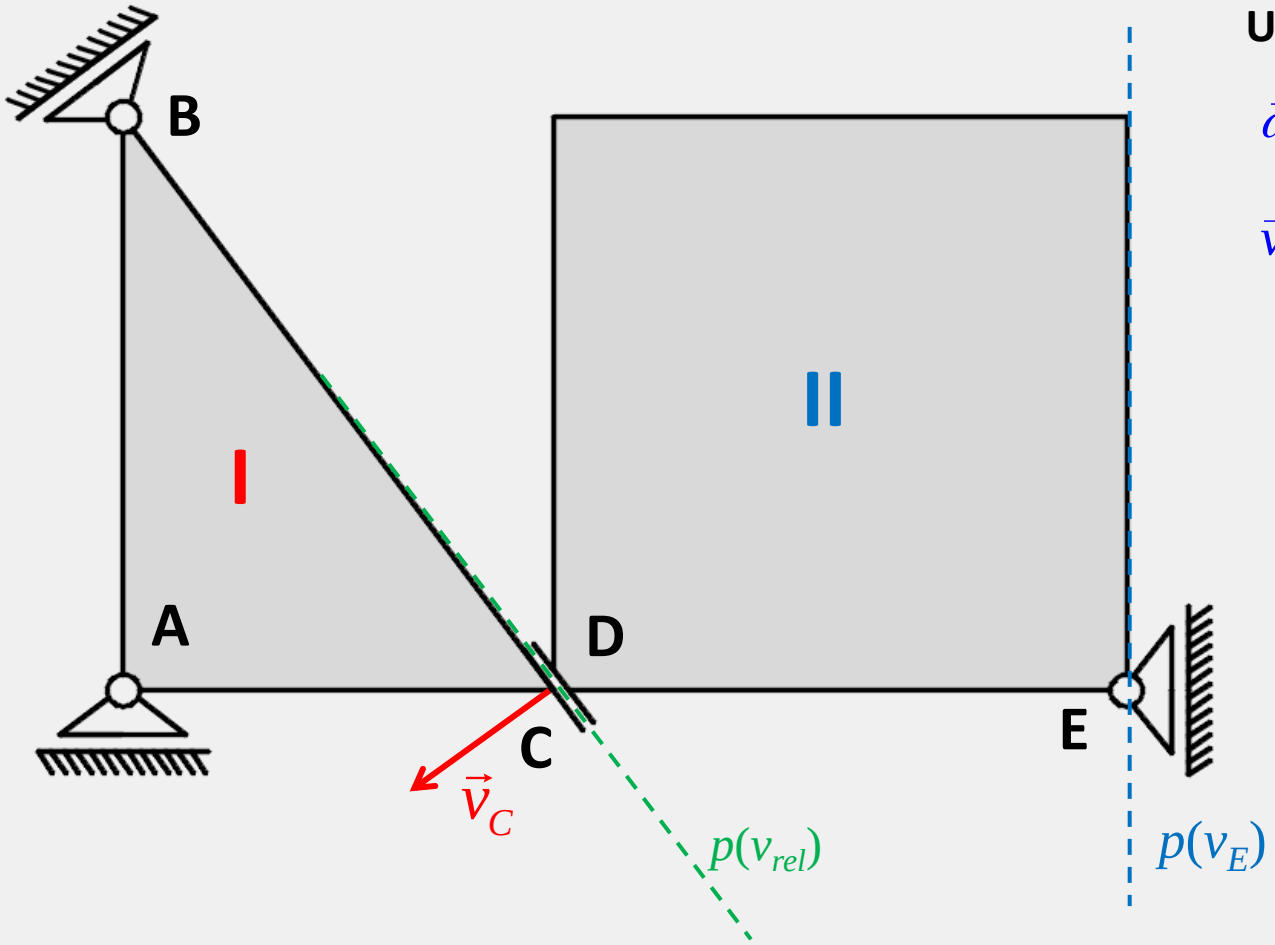
$$\vec{\omega}_{II} = \vec{\omega}_I = -2\,\vec{k}$$



Uvjeti spoja tijela I i II

$$\vec{\omega}_{II} = \vec{\omega}_I = -2\,\vec{k}$$

$$\vec{v}_D = \vec{v}_C + \vec{v}_{rel}$$



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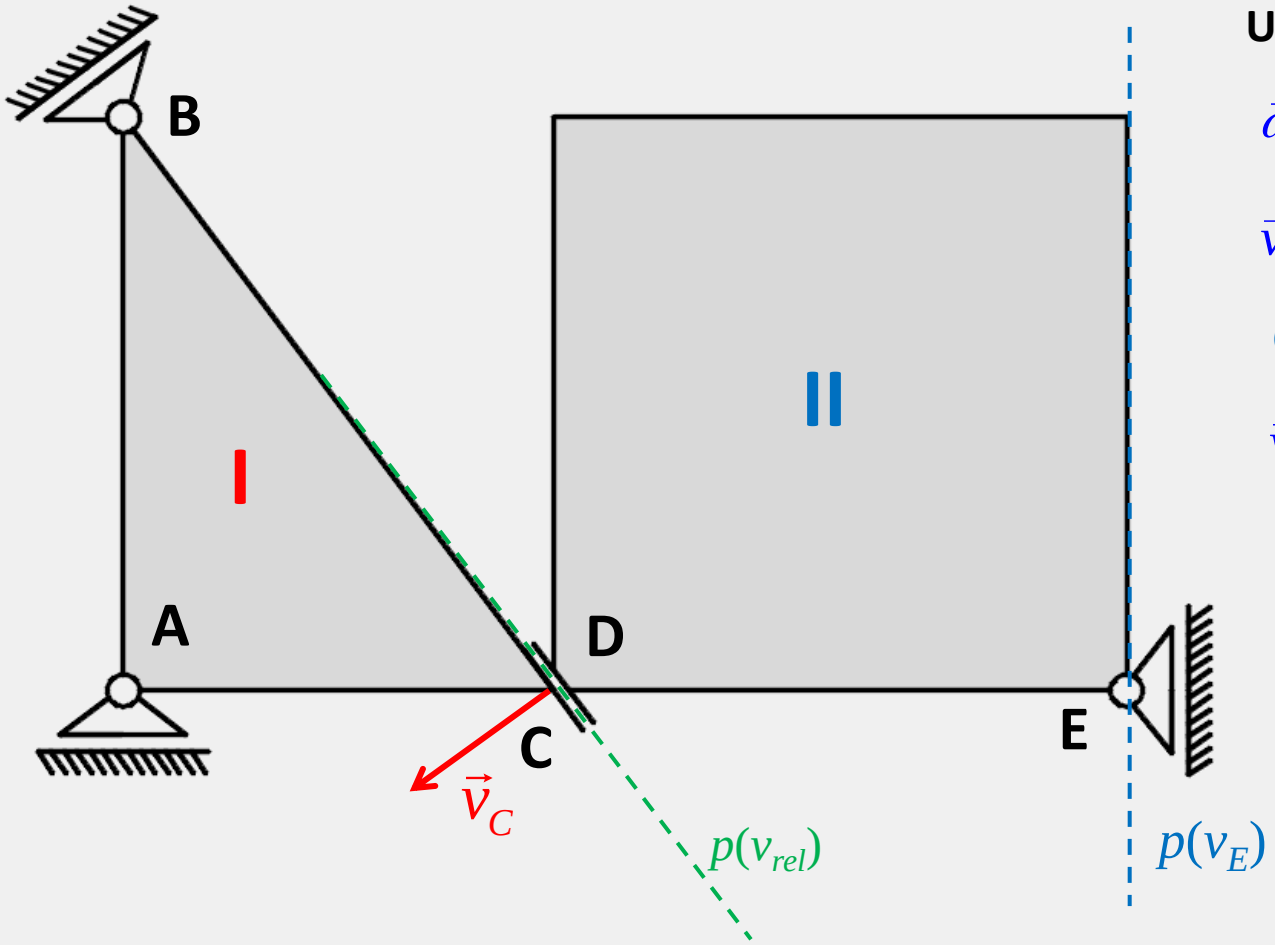

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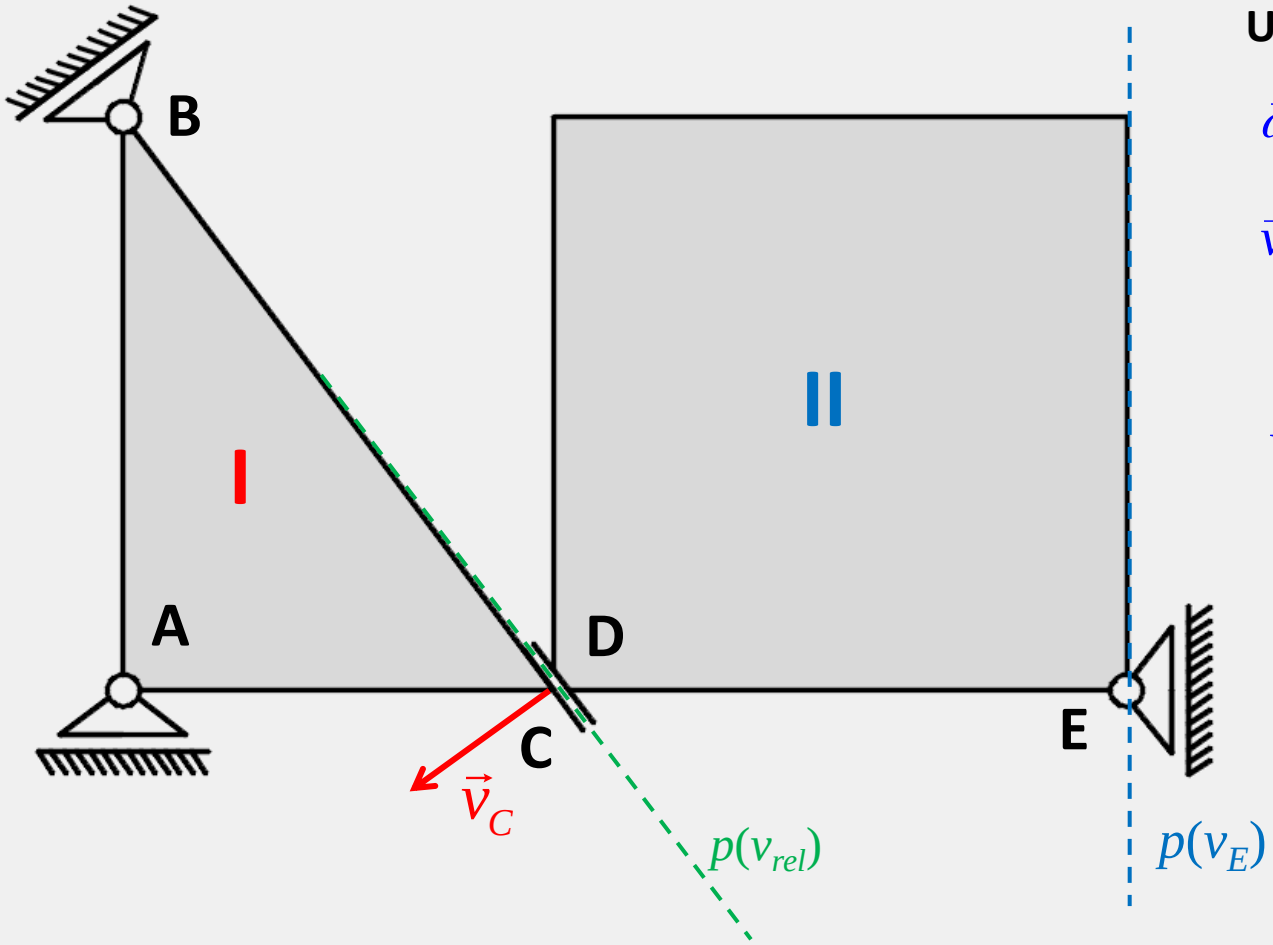
Gibanje tijela II

$$\vec{v}_D = \vec{v}_E + \vec{v}_{D/E}$$



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Gibanje tijela II

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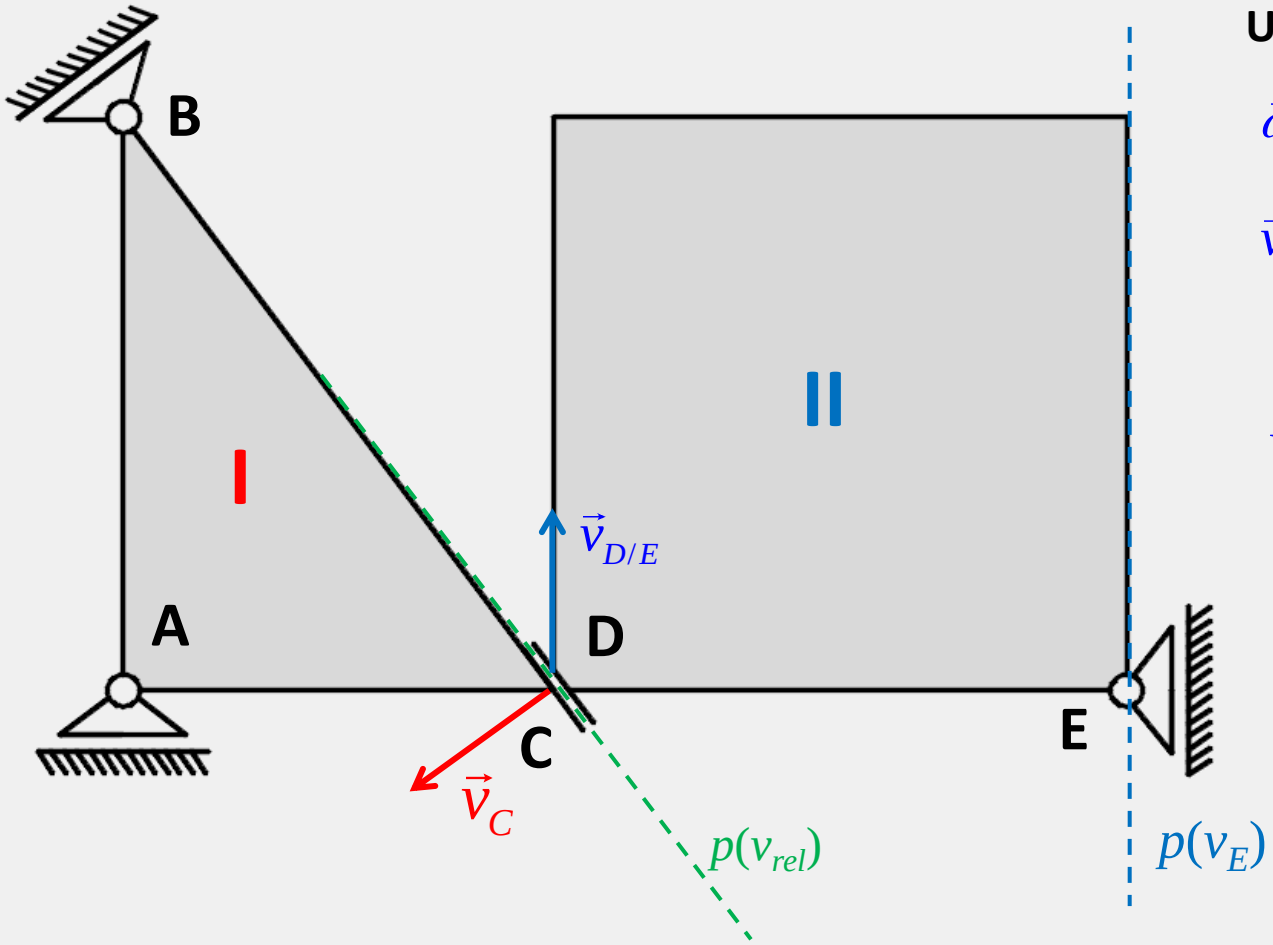

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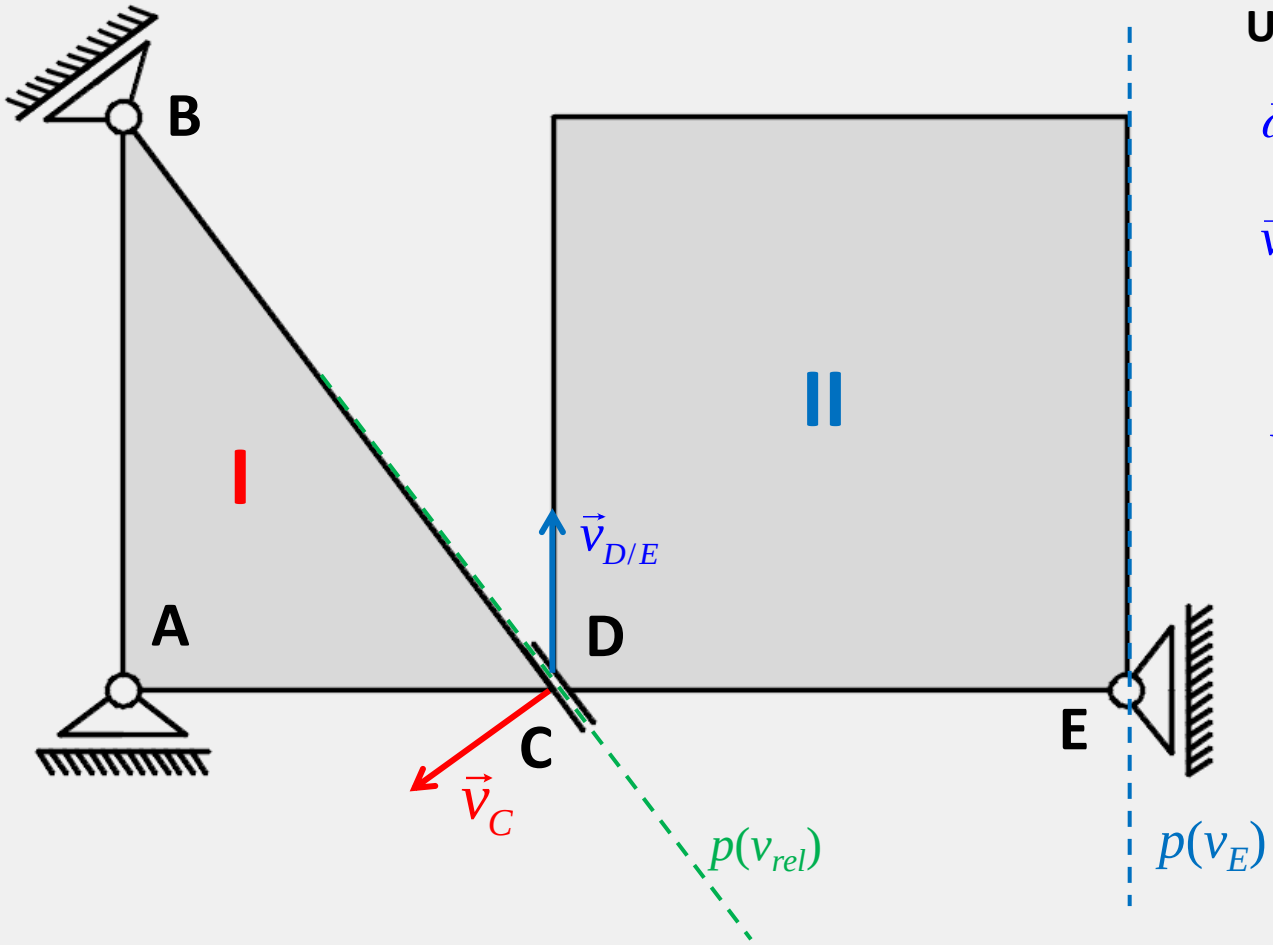
$$\vec{v}_{D/E} = 2 \cdot 2\vec{j} = 4\vec{j}$$



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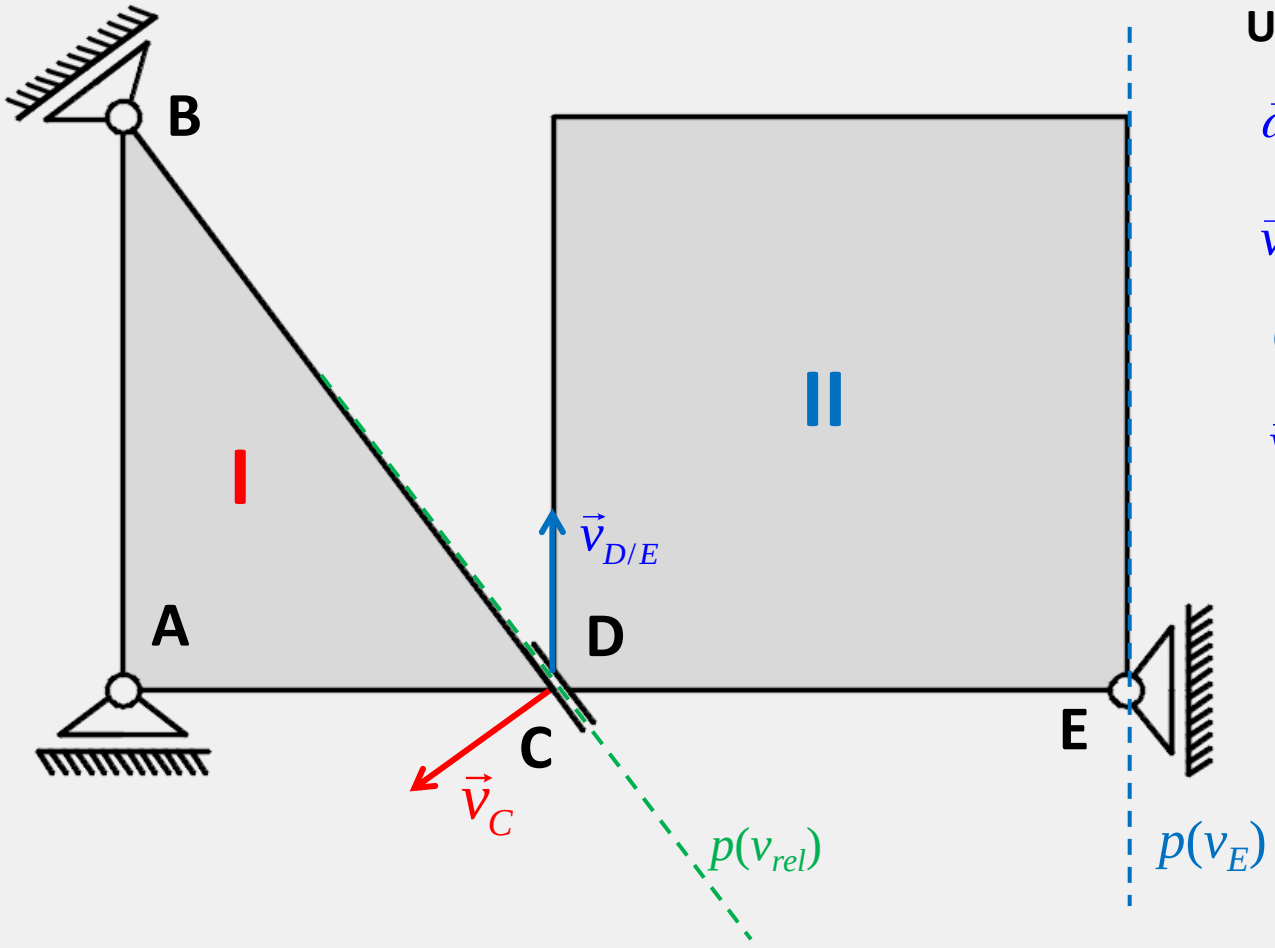
MJ 1cm=2m/s



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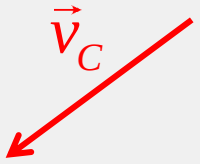

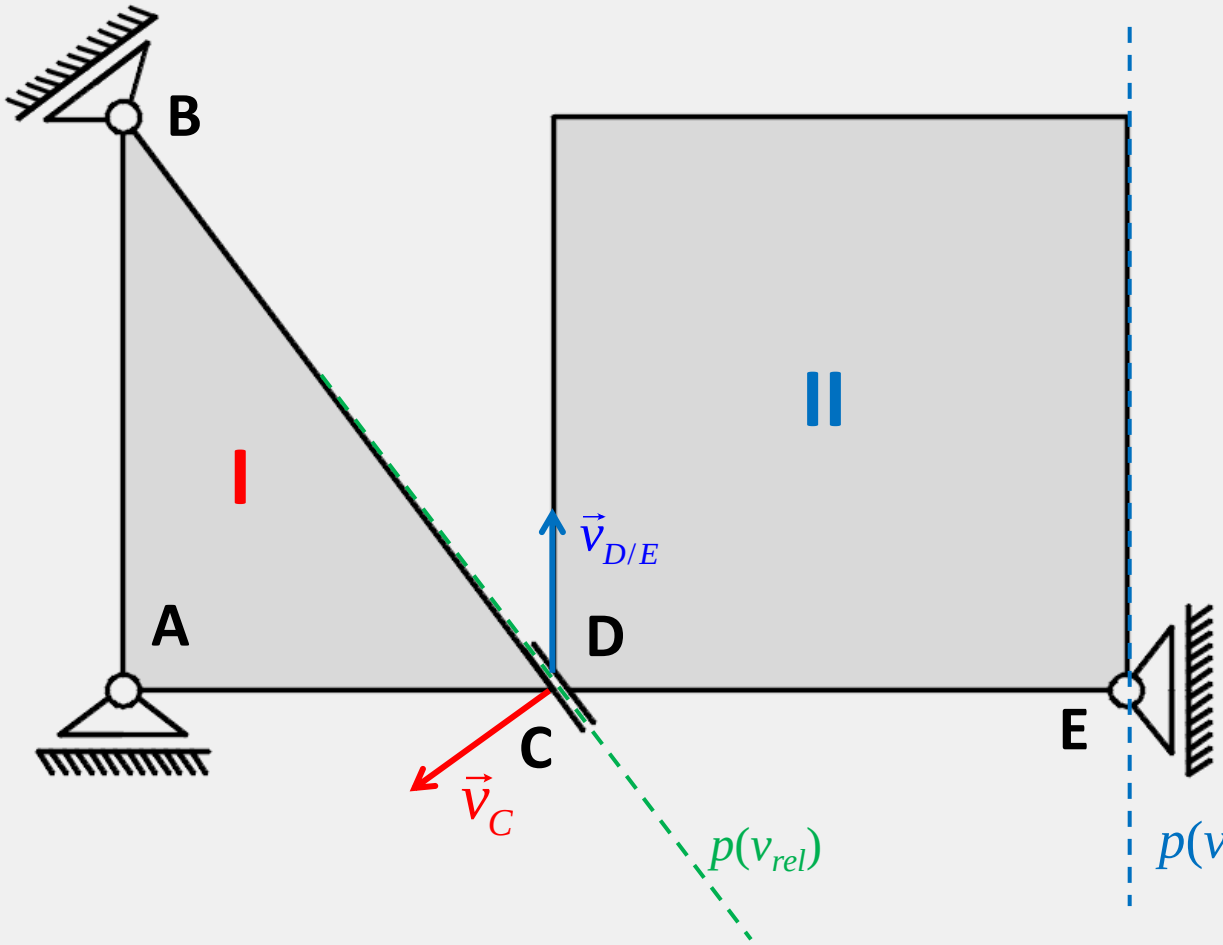

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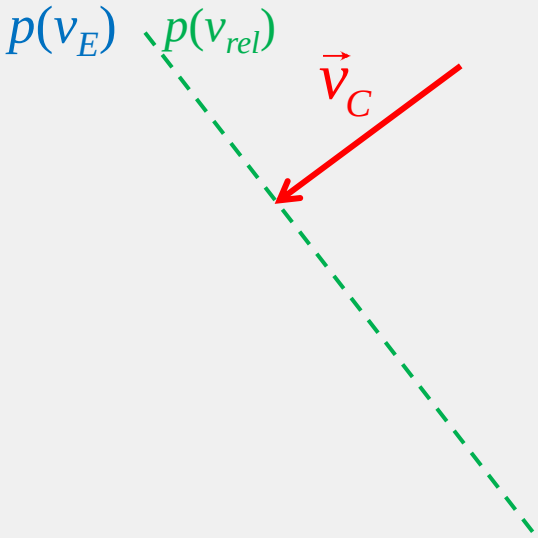

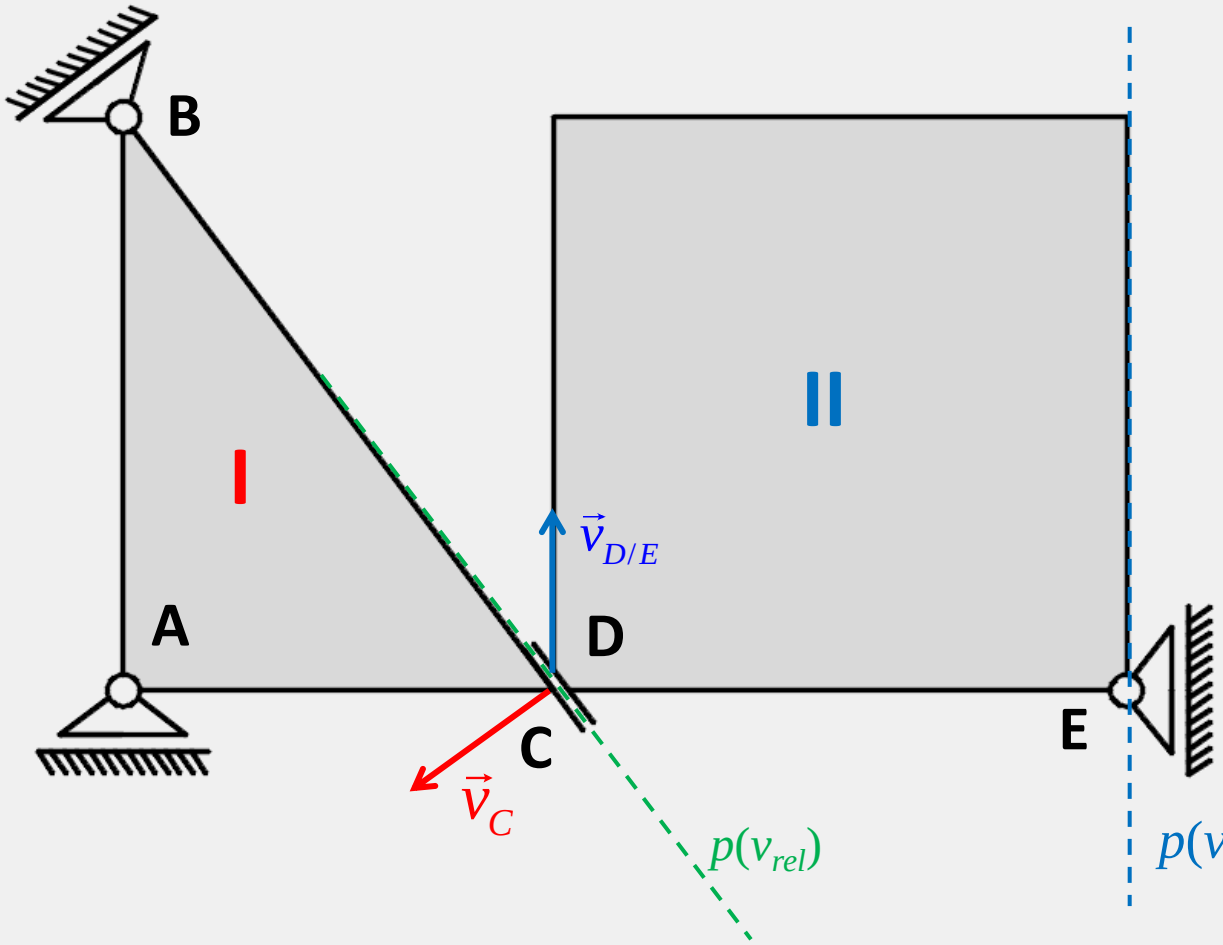

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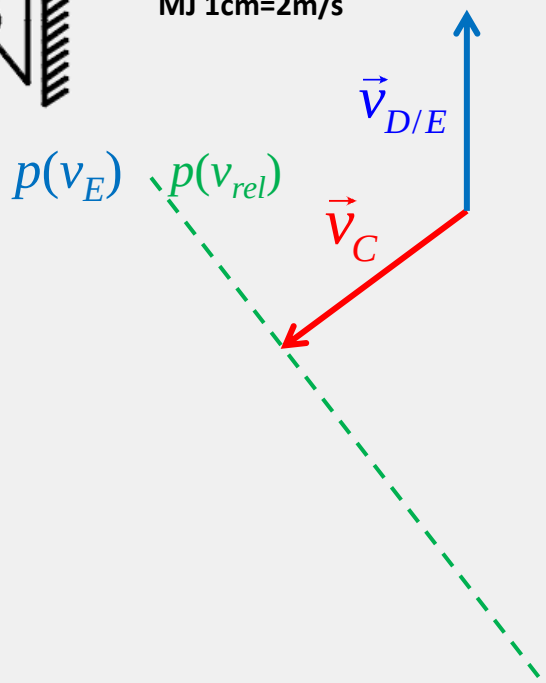

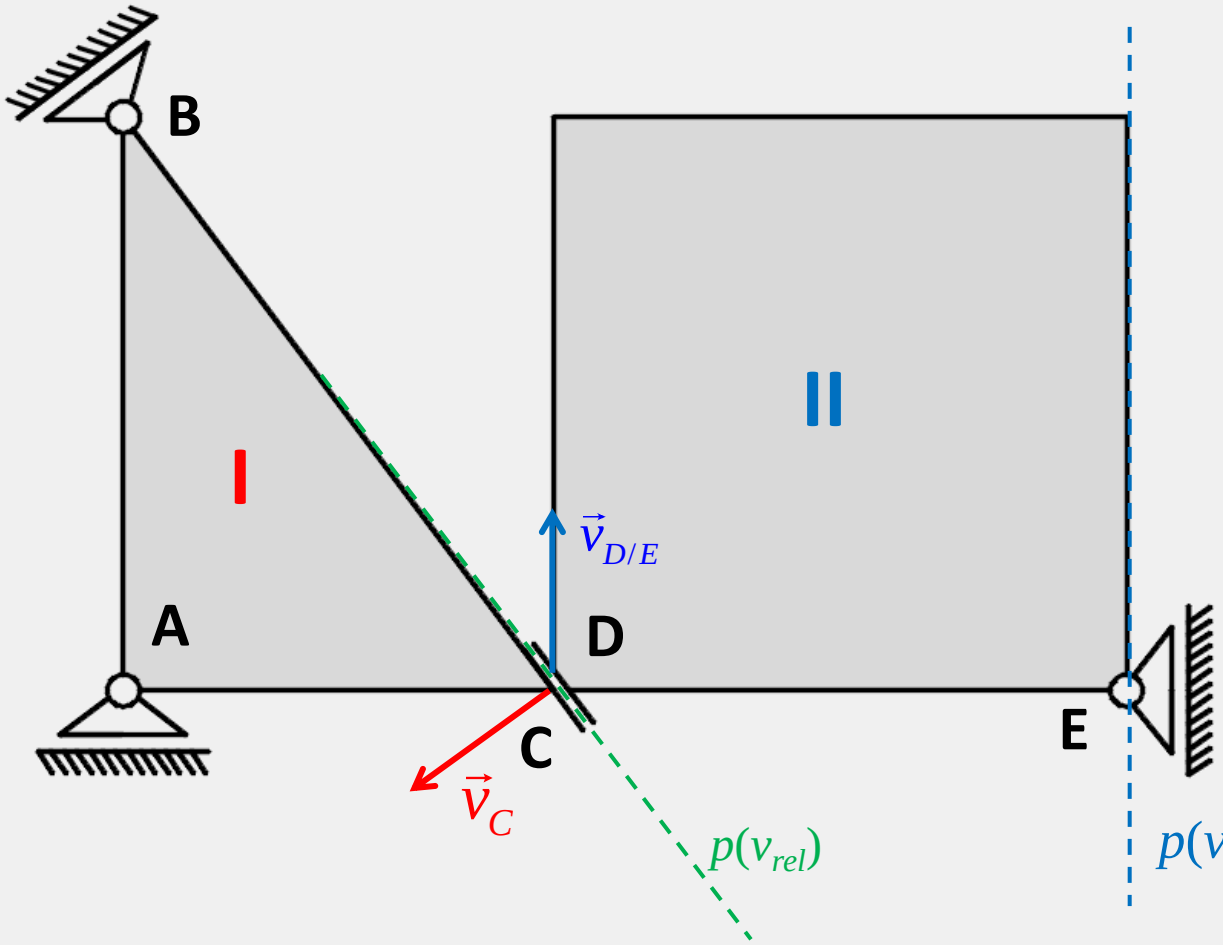

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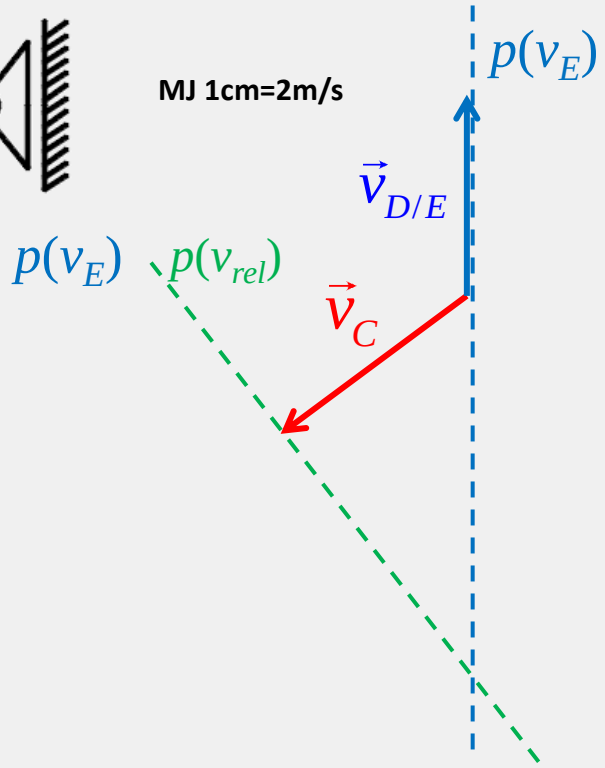

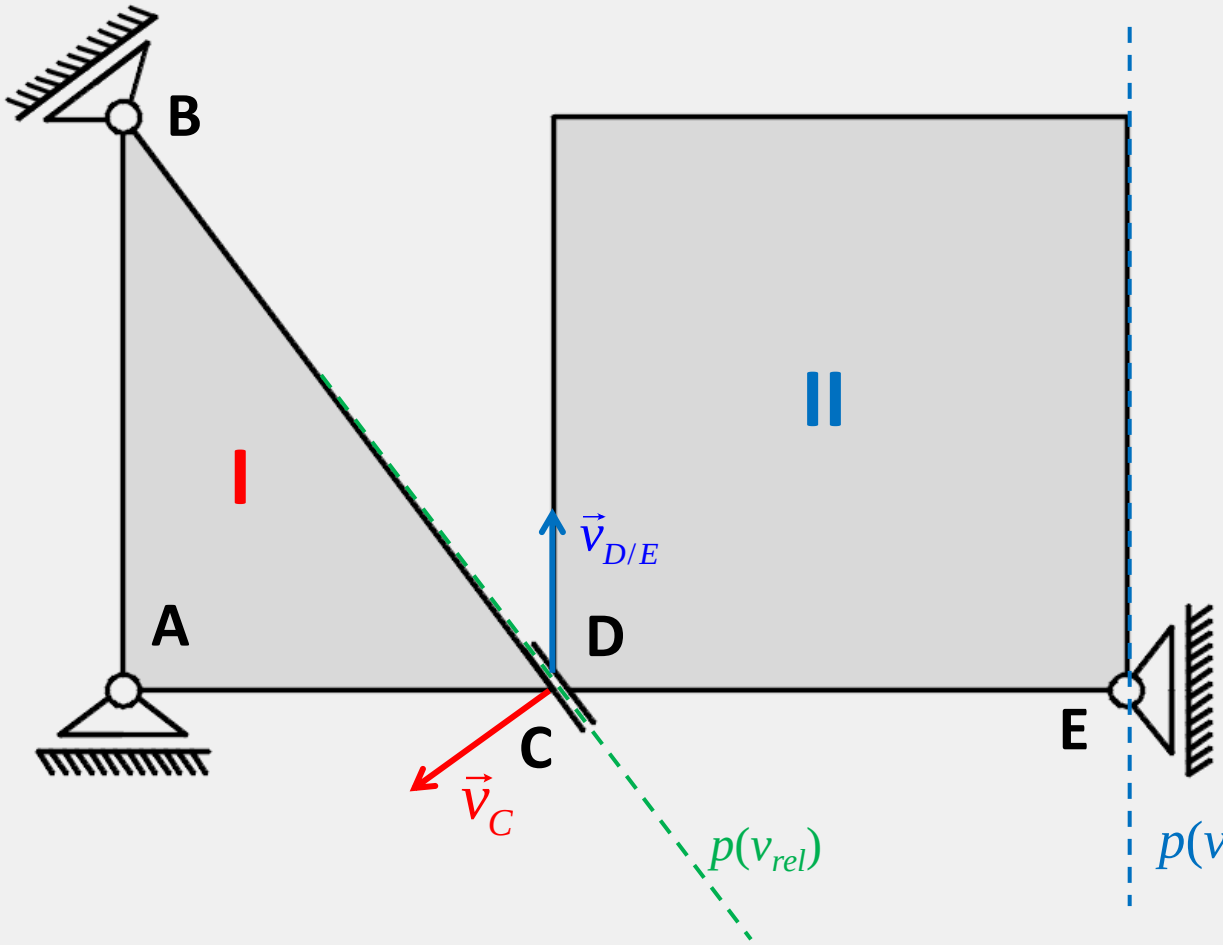

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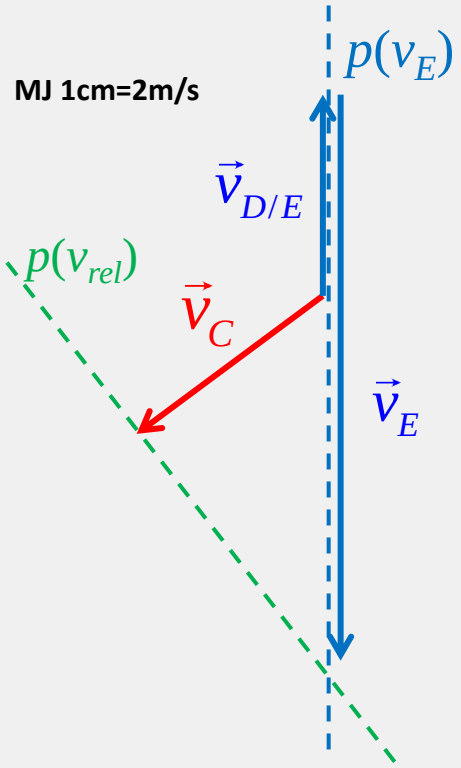

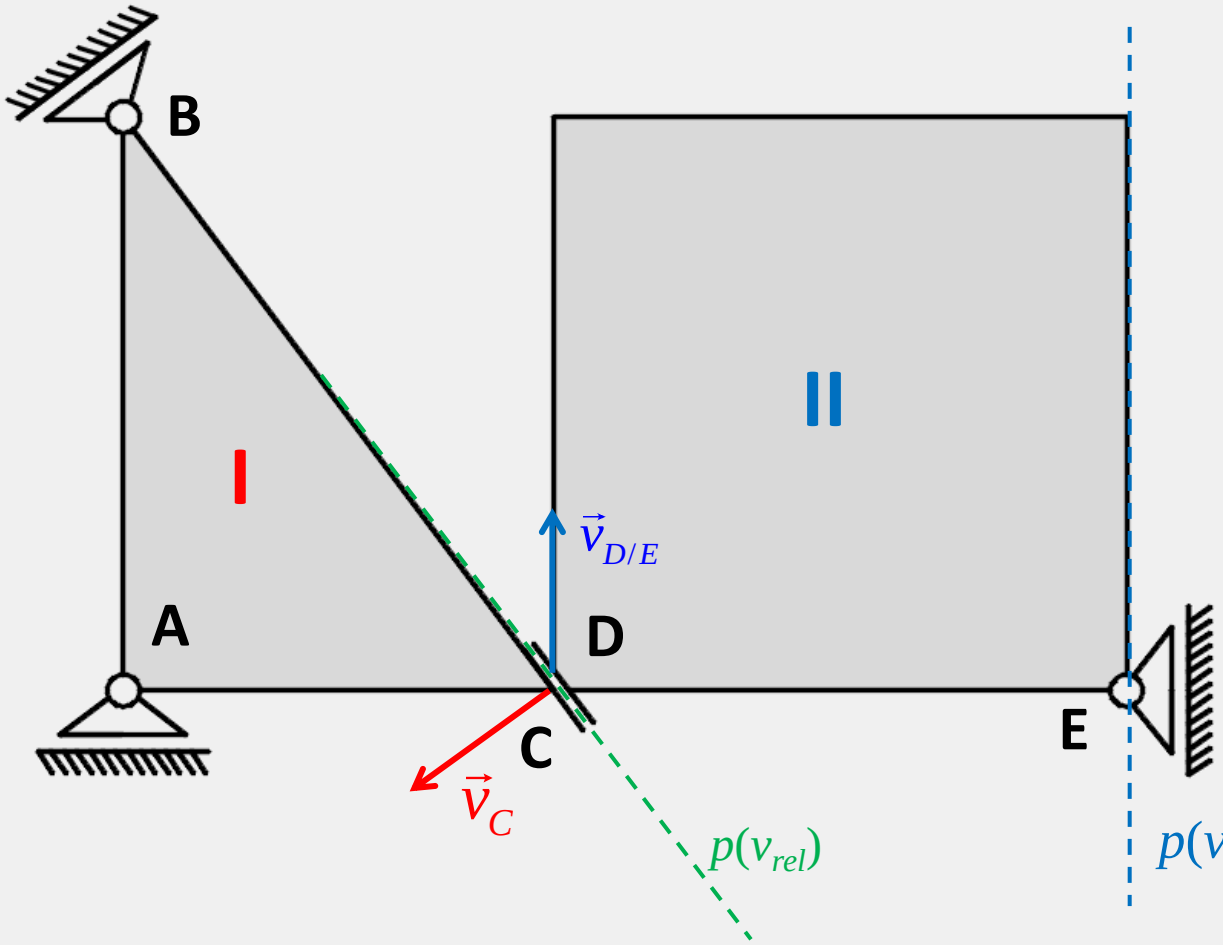

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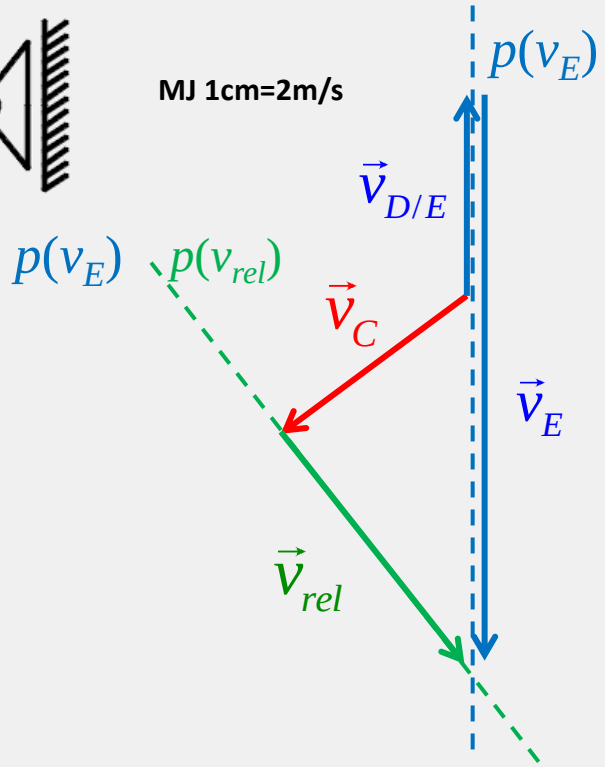

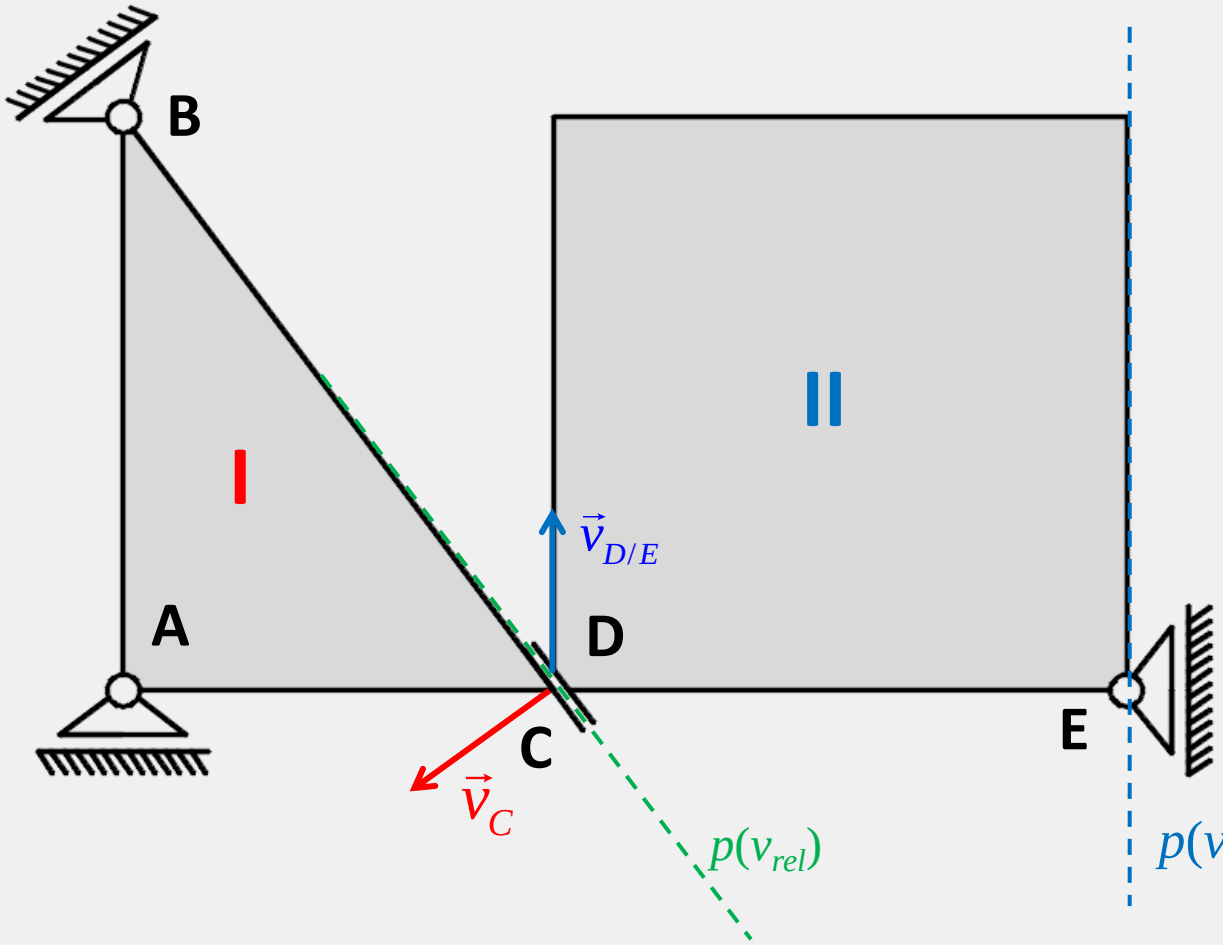

Uvjeti spoja tijela I i II

$$\vec{\omega}_{II} = \vec{\omega}_I = -2\vec{k}$$

$$\vec{v}_D = \vec{v}_C + \vec{v}_{rel}$$

Gibanje tijela II

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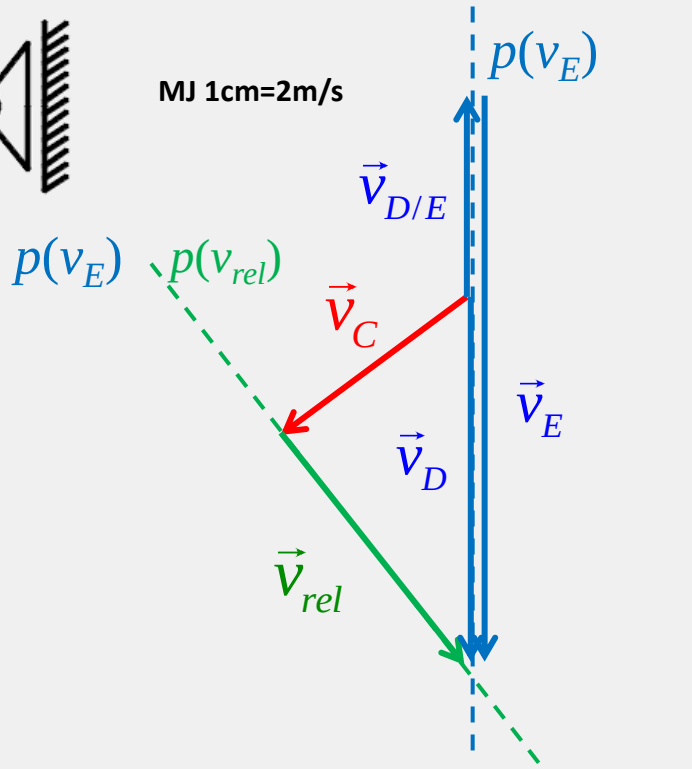

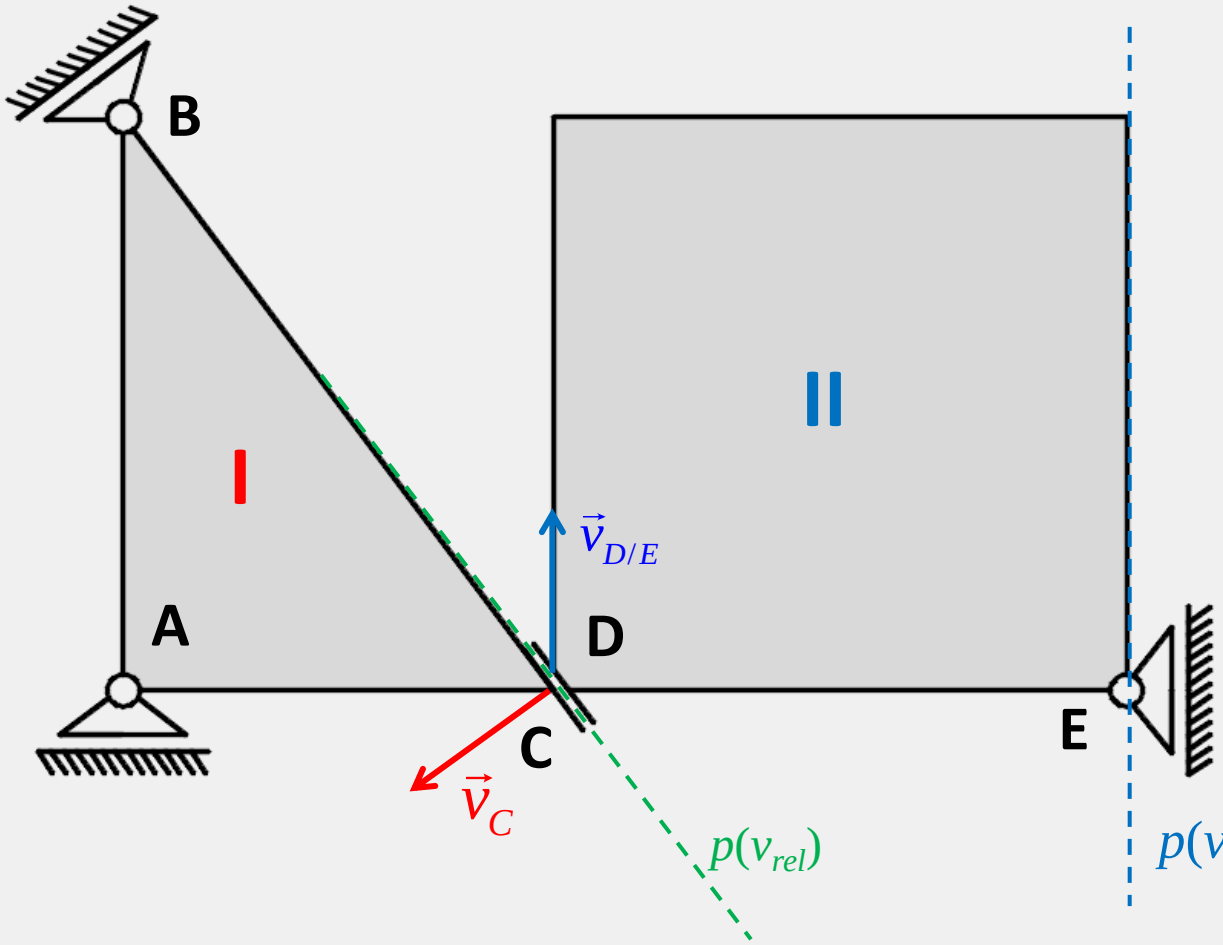

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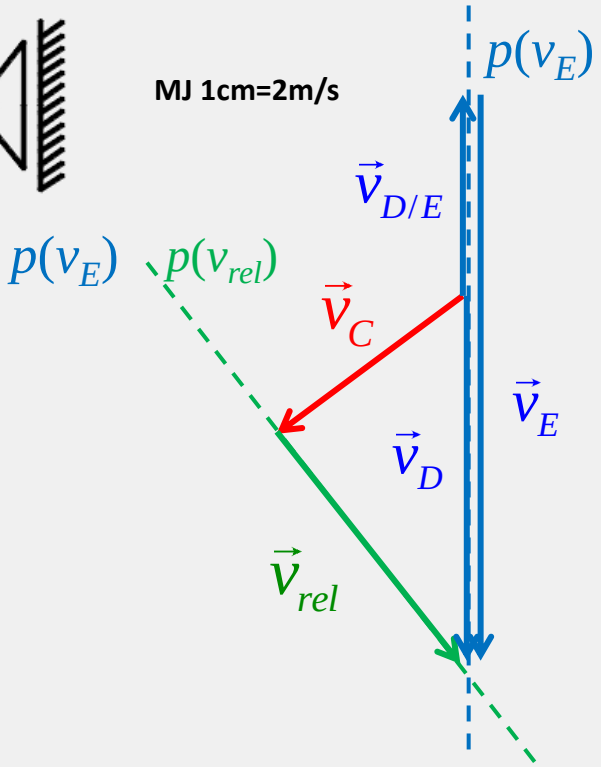
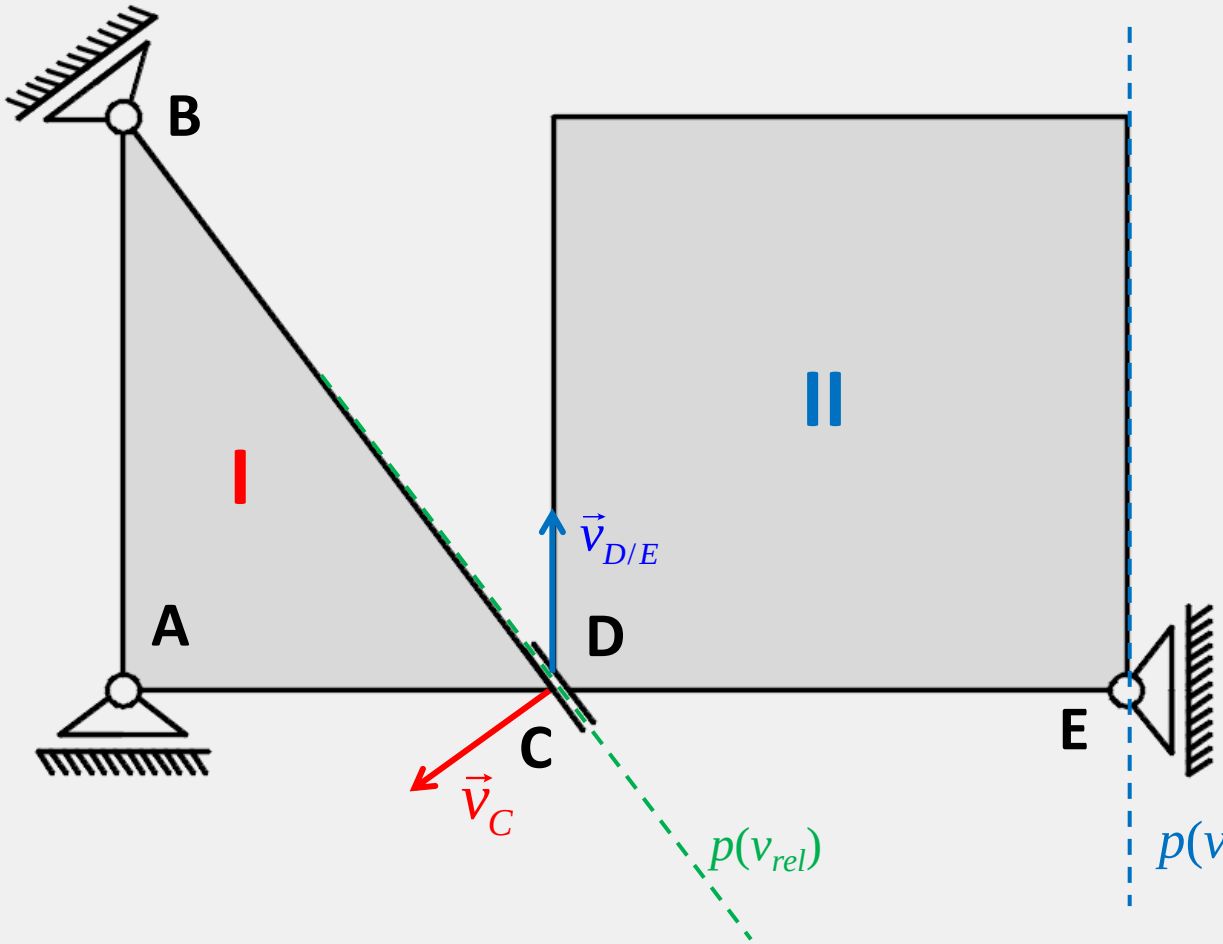


očitano:



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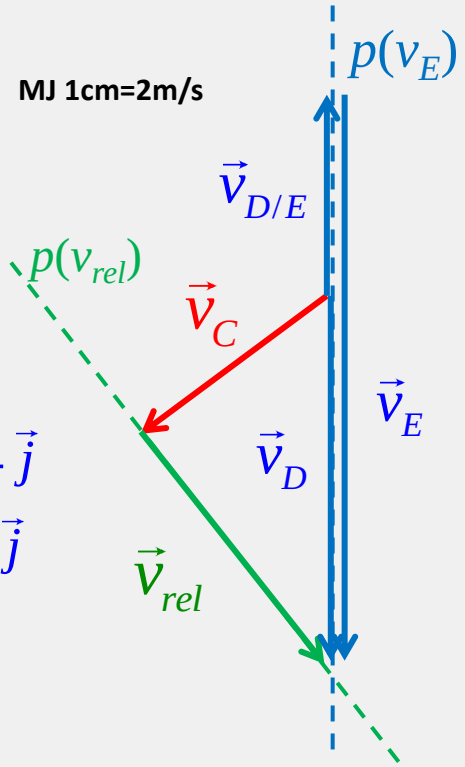
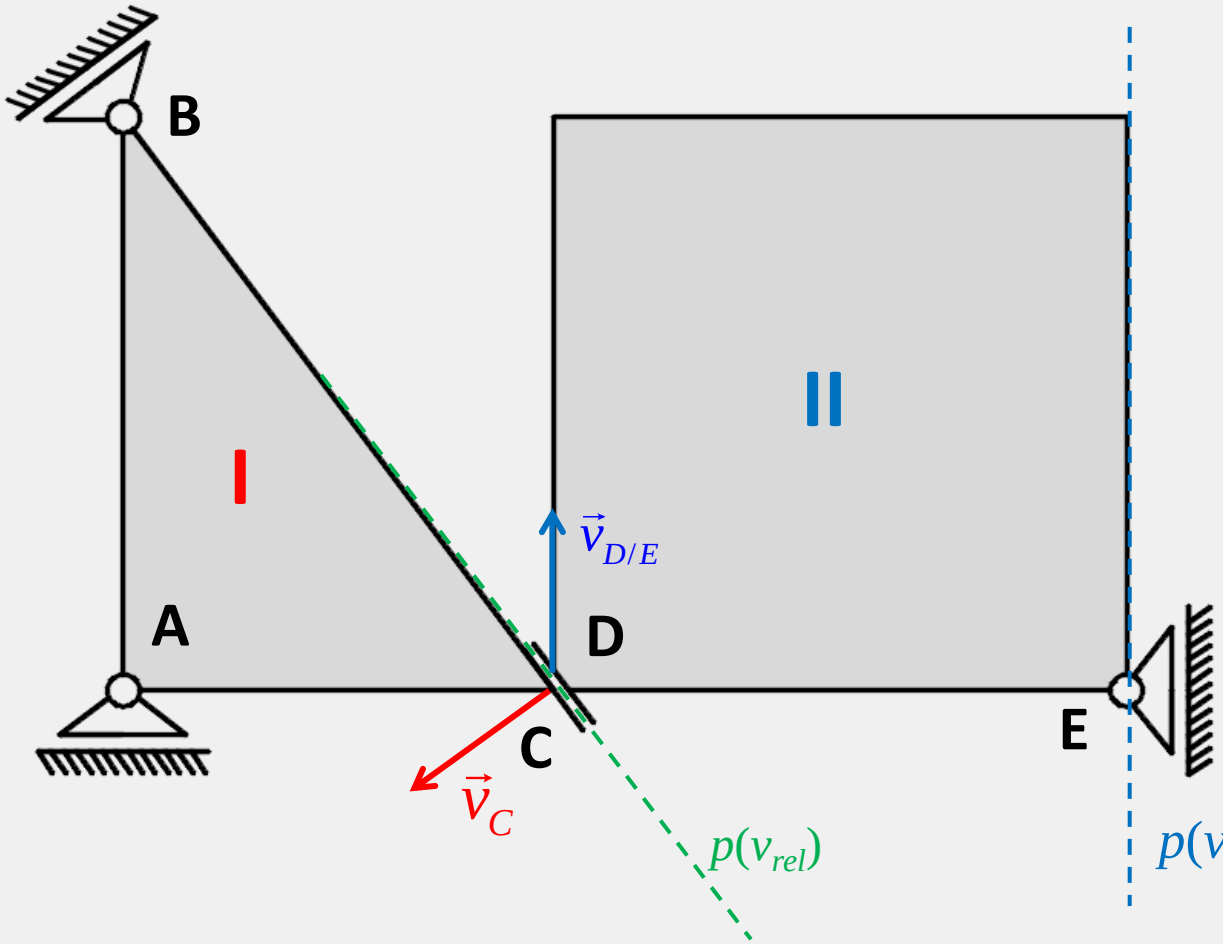


očitano:

$$v_E = 6,2\ cm = 12,4\ m/s \qquad \vec{v}_E = -12,4\,\vec{j}$$

$$v_D = 4,2\ cm = 8,4\ m/s \qquad \vec{v}_D = -8,4\,\vec{j}$$



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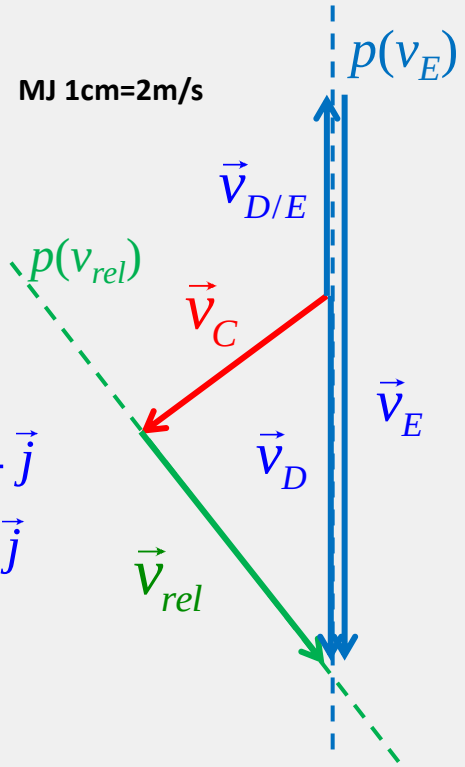


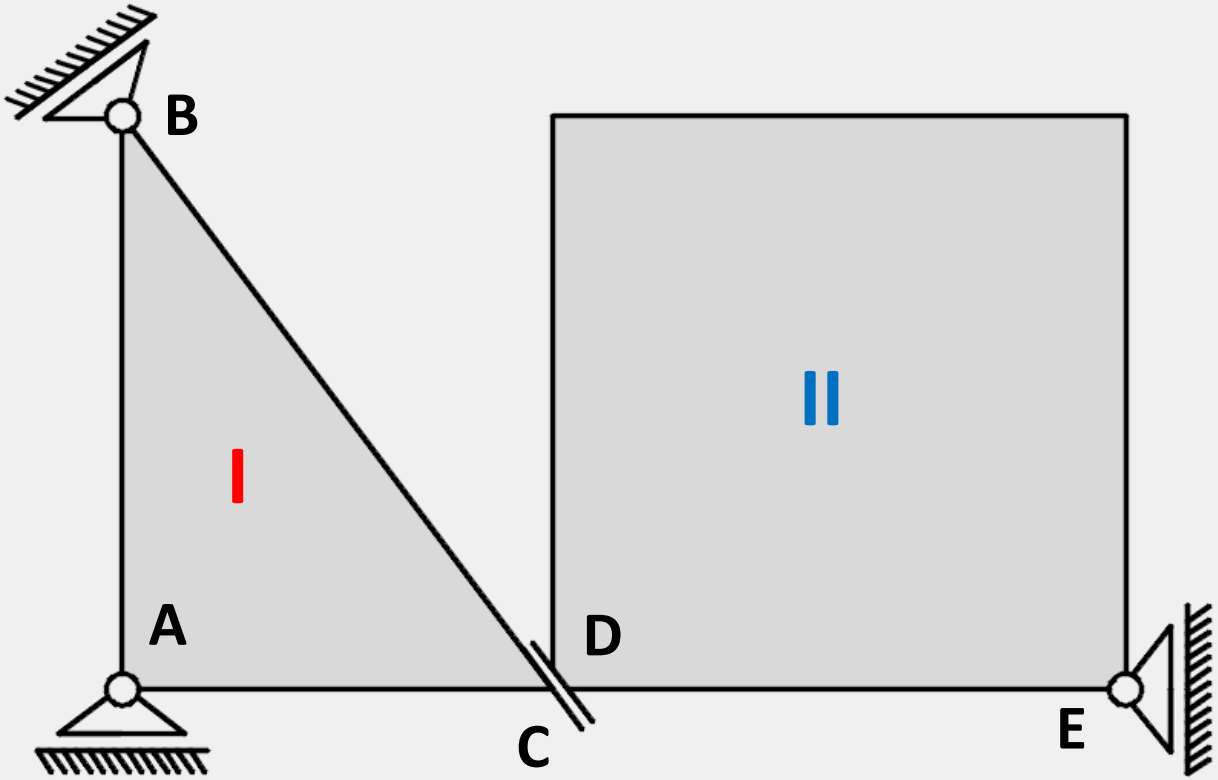
očitano:

$$v_E = 6,2\ cm = 12,4\ m/s \qquad \vec{v}_E = -12,4\,\vec{j}$$

$$v_D = 4,2\ cm = 8,4\ m/s \qquad \vec{v}_D = -8,4\,\vec{j}$$

$$v_{rel} = 3,4\,cm = 6,8\,m/s$$

$$\vec{v}_{rel} = 4\vec{i} - 5,4\,\vec{j}$$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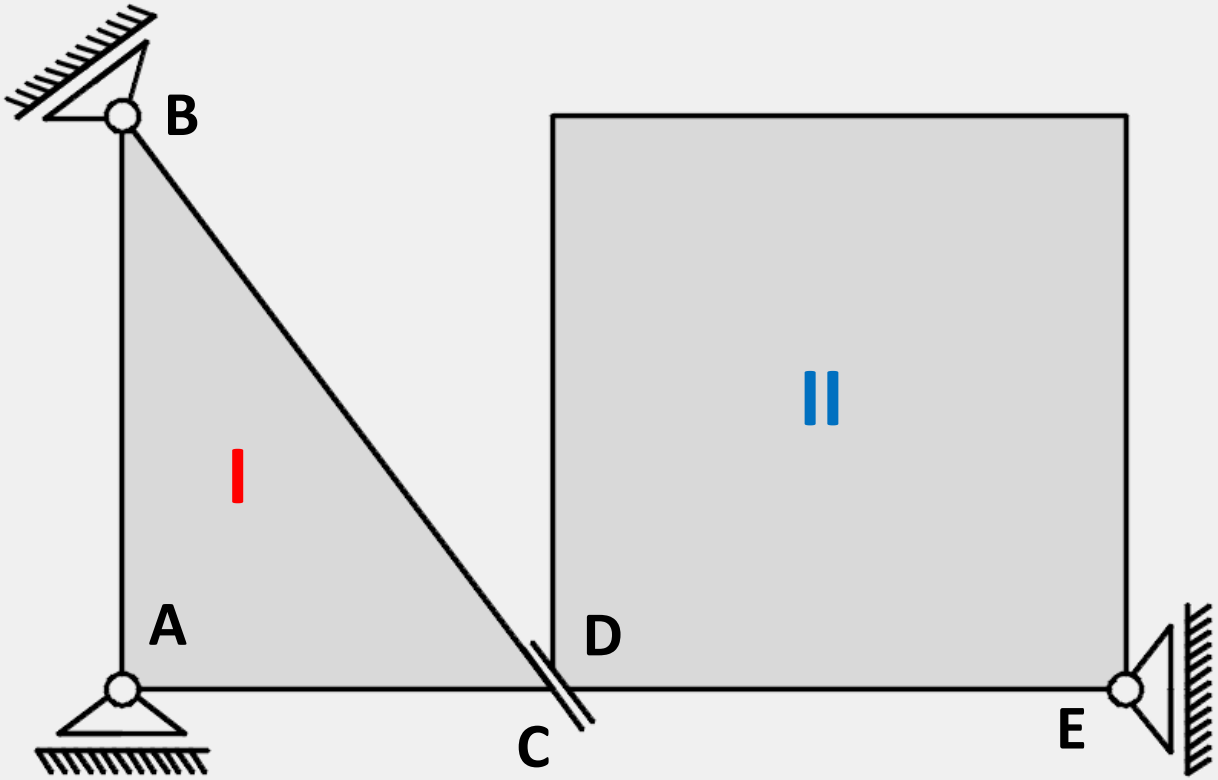
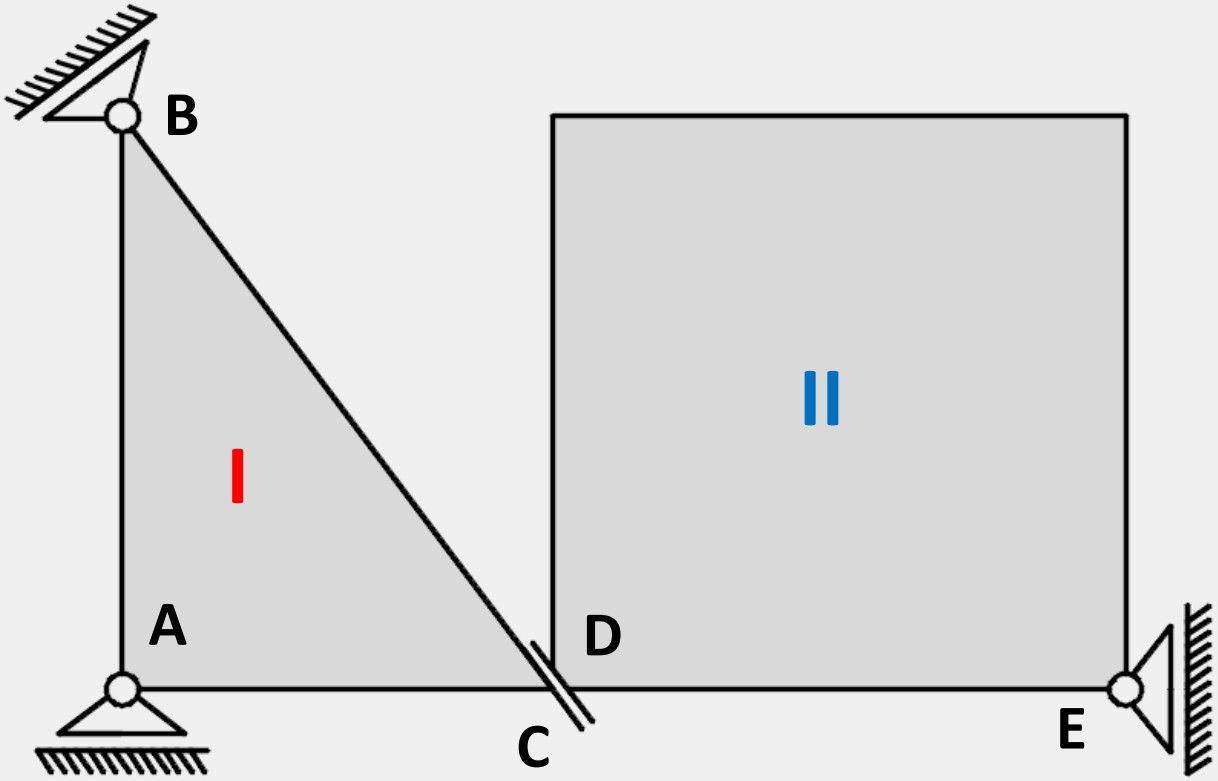
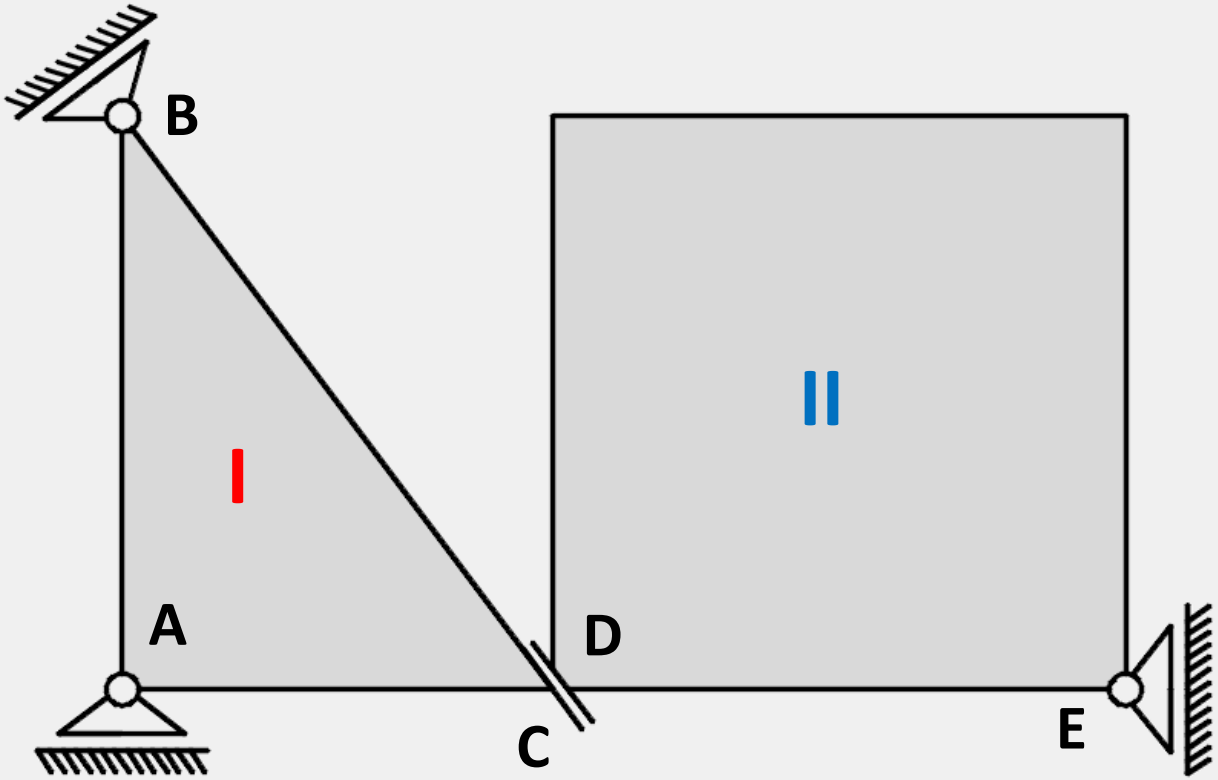
Gibanje tijela I





Gibanje tijela I

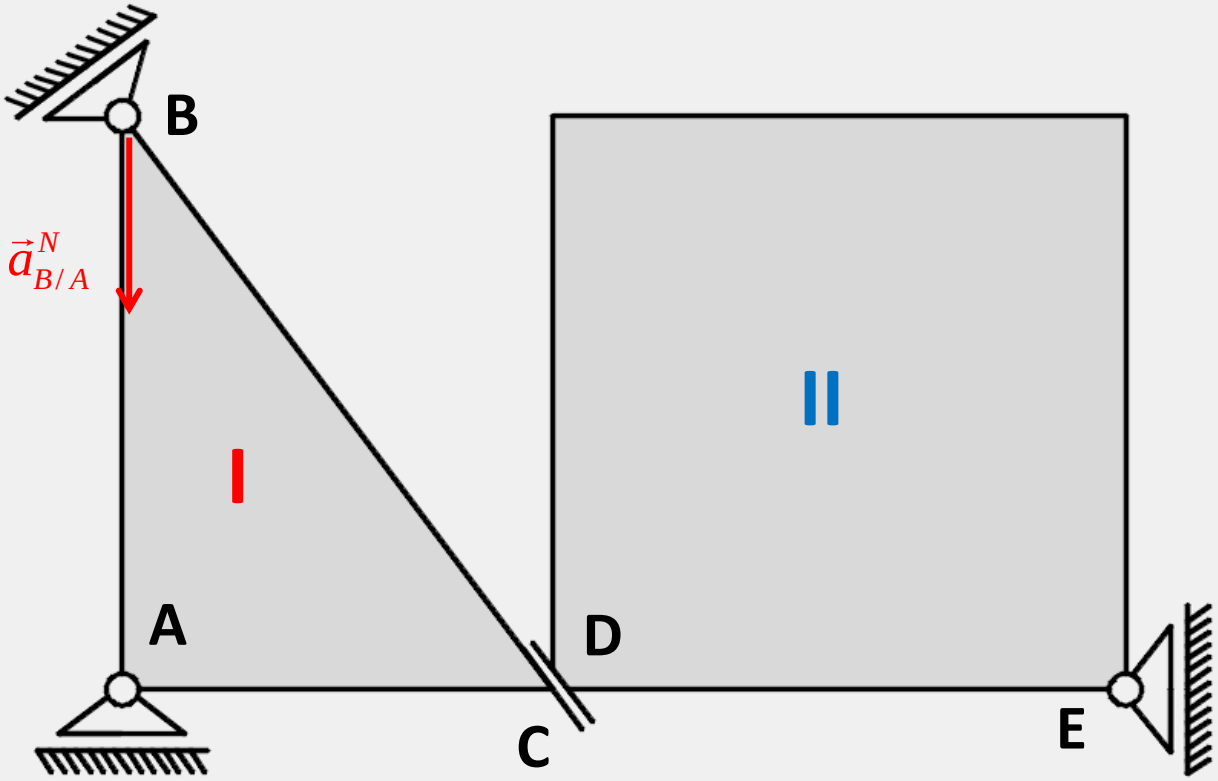
$$\vec{a}_A = 0 \qquad (v_A = const.)$$



Gibanje tijela I

$$\vec{a}_A = 0 \qquad (v_A = const.)$$

$$\vec{a}_B = \cancel{\vec{a}_A} + \vec{a}^{\,N}_{B/A} + \vec{a}^{\,T}_{B/A}$$



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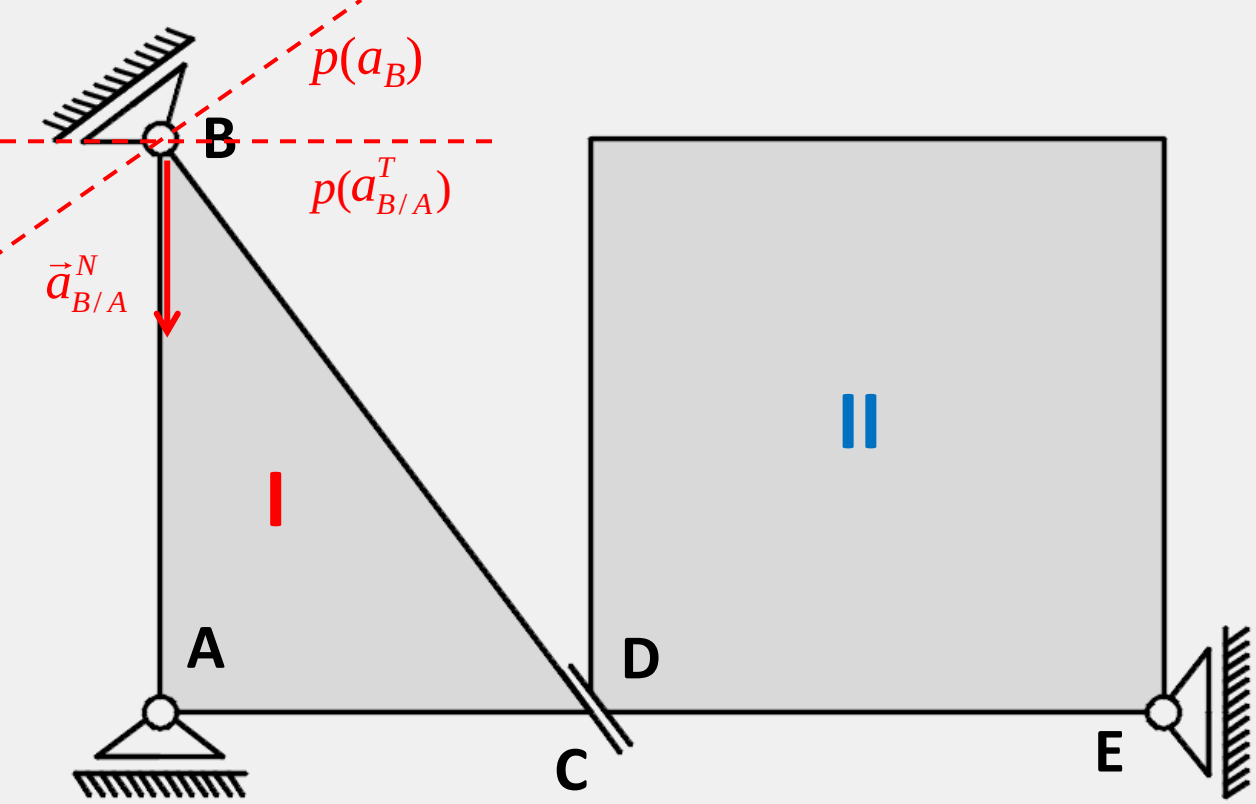
$$\vec{a}_B = \cancel{\vec{a}_A} + \vec{a}_{B/A}^{N} + \vec{a}_{B/A}^{T}$$

$$\vec{a}_{B/A}^{N} = -\omega_I^2 \cdot 2 = -8\vec{j}$$



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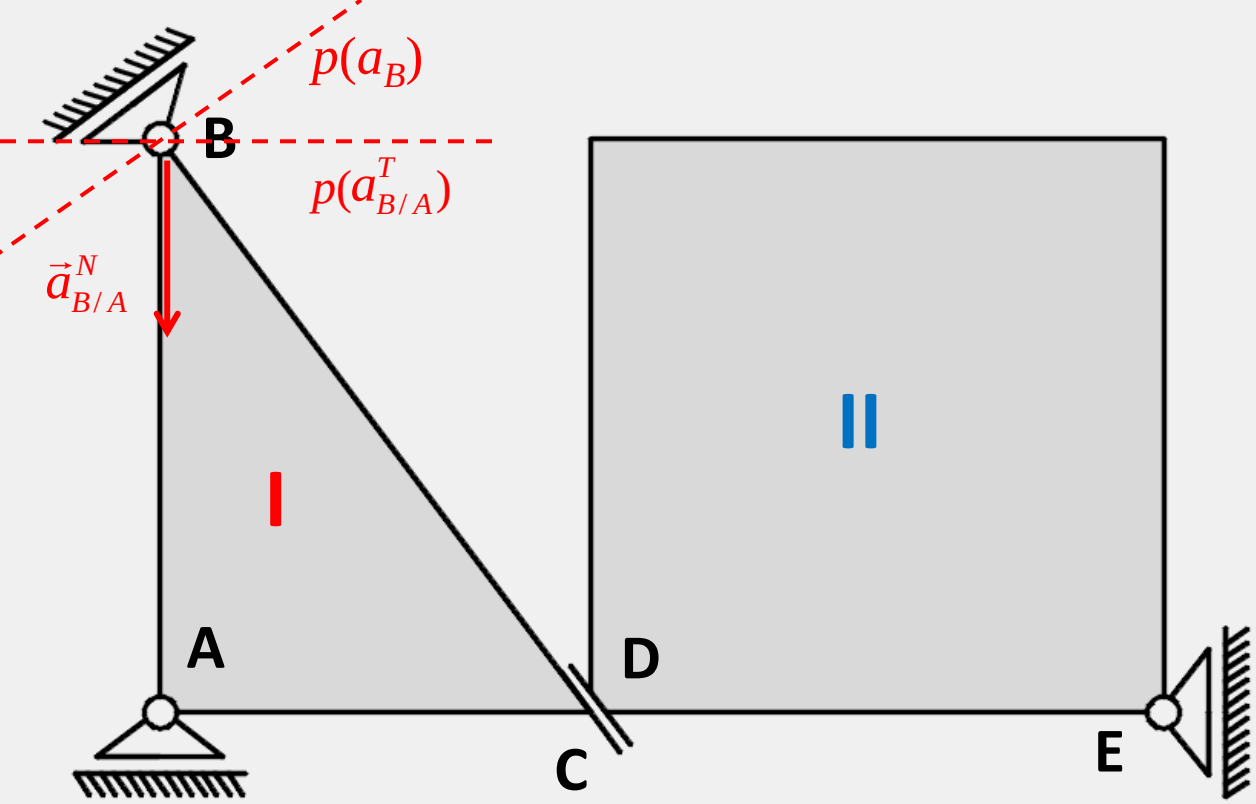

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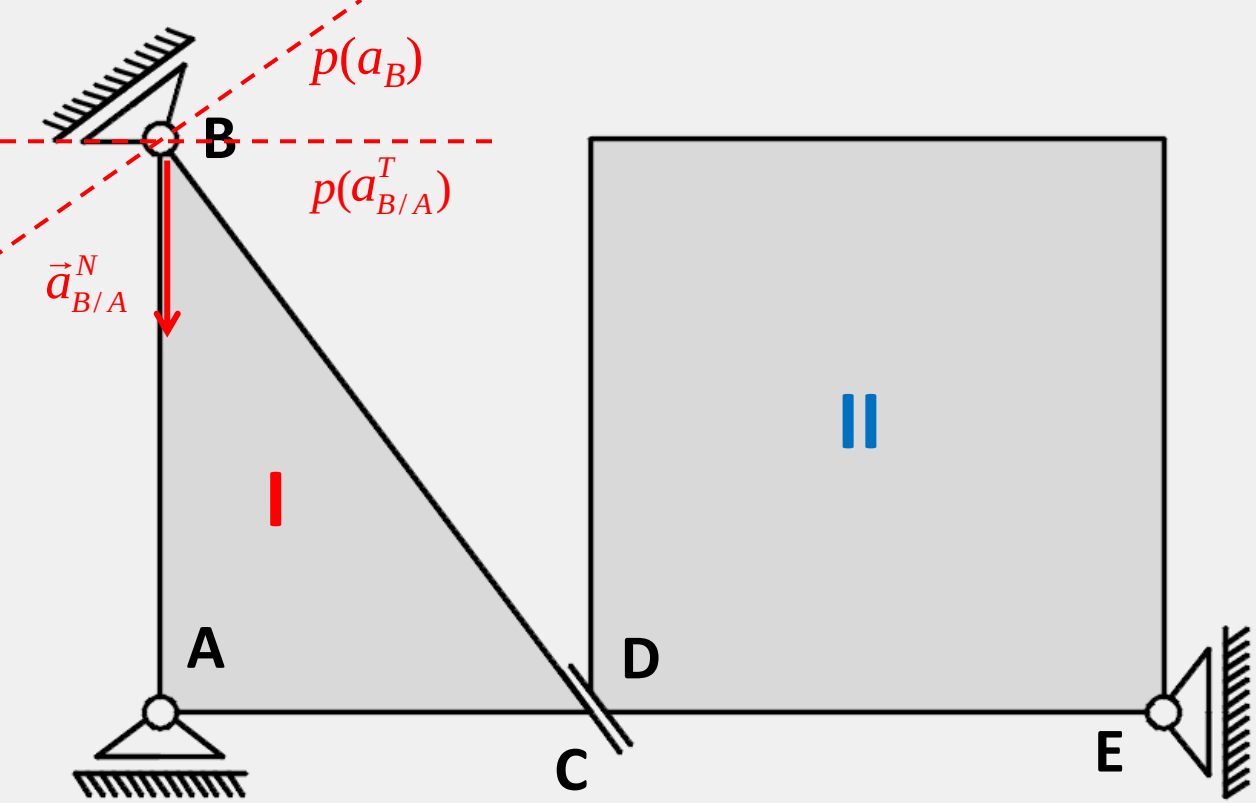
MJ 1cm=2m/s



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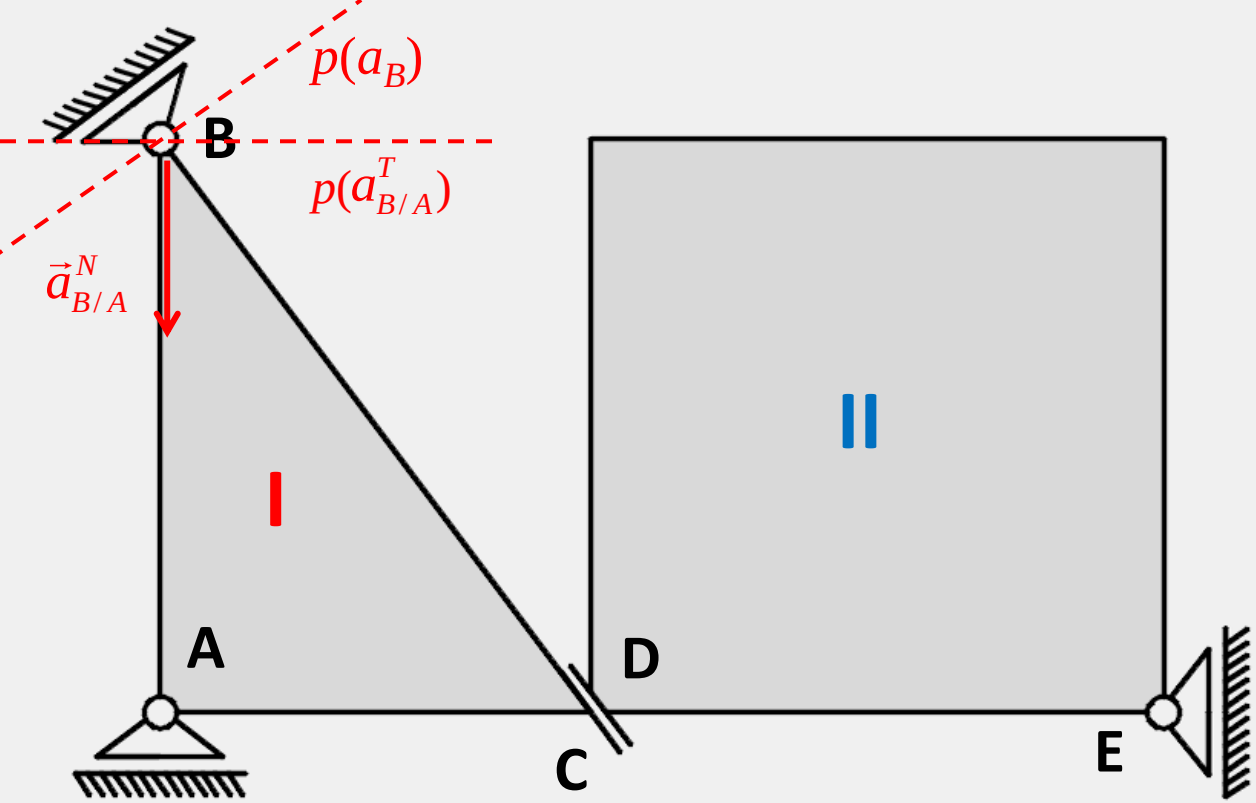

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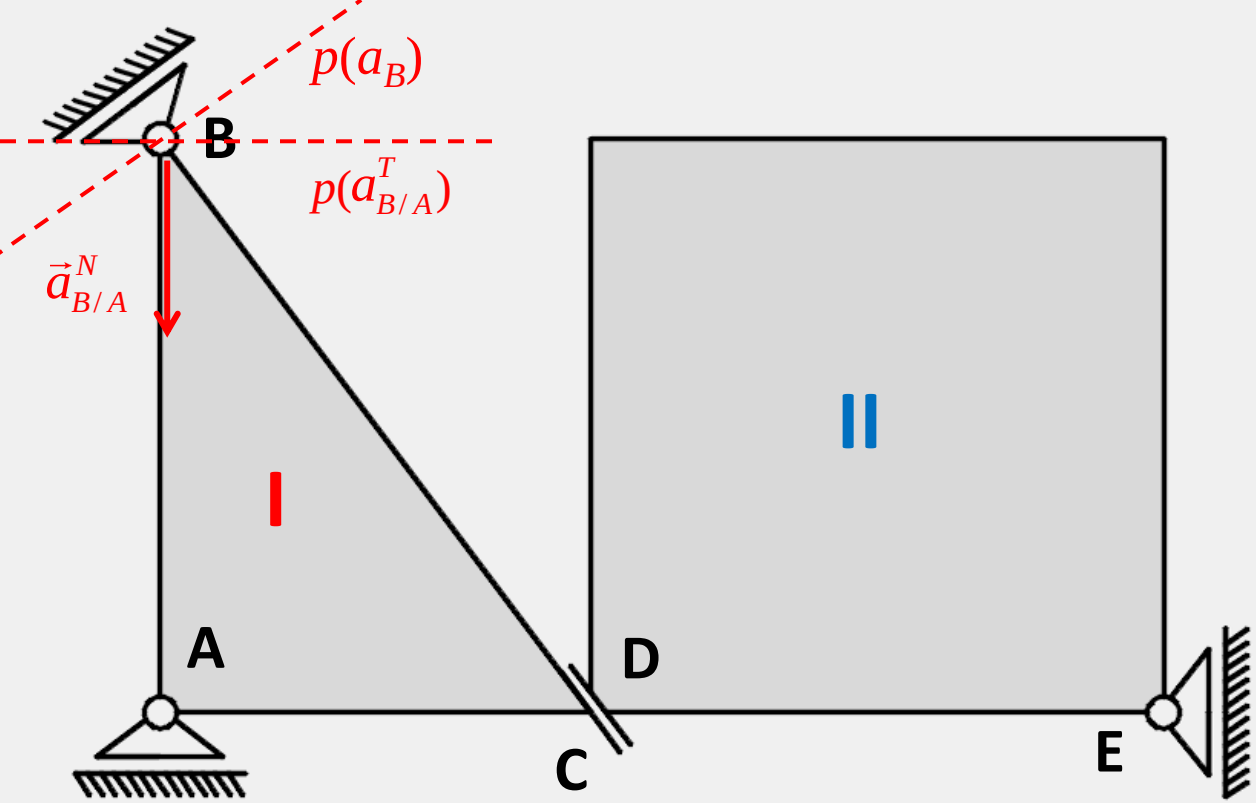

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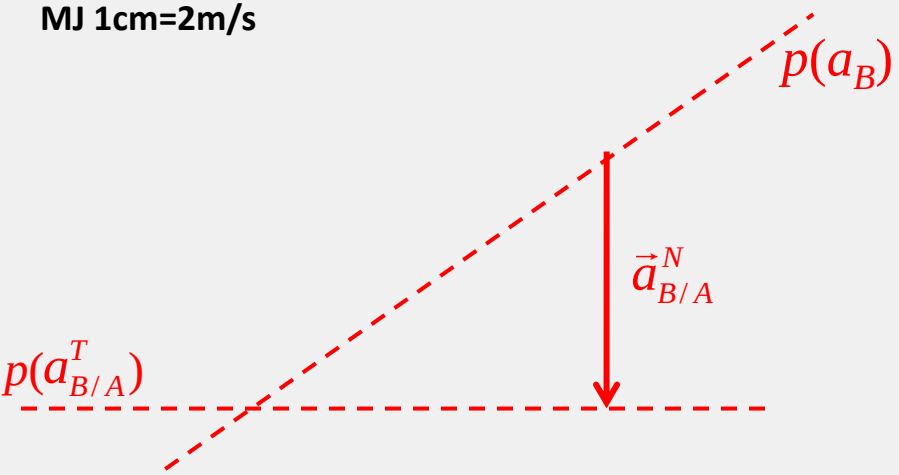

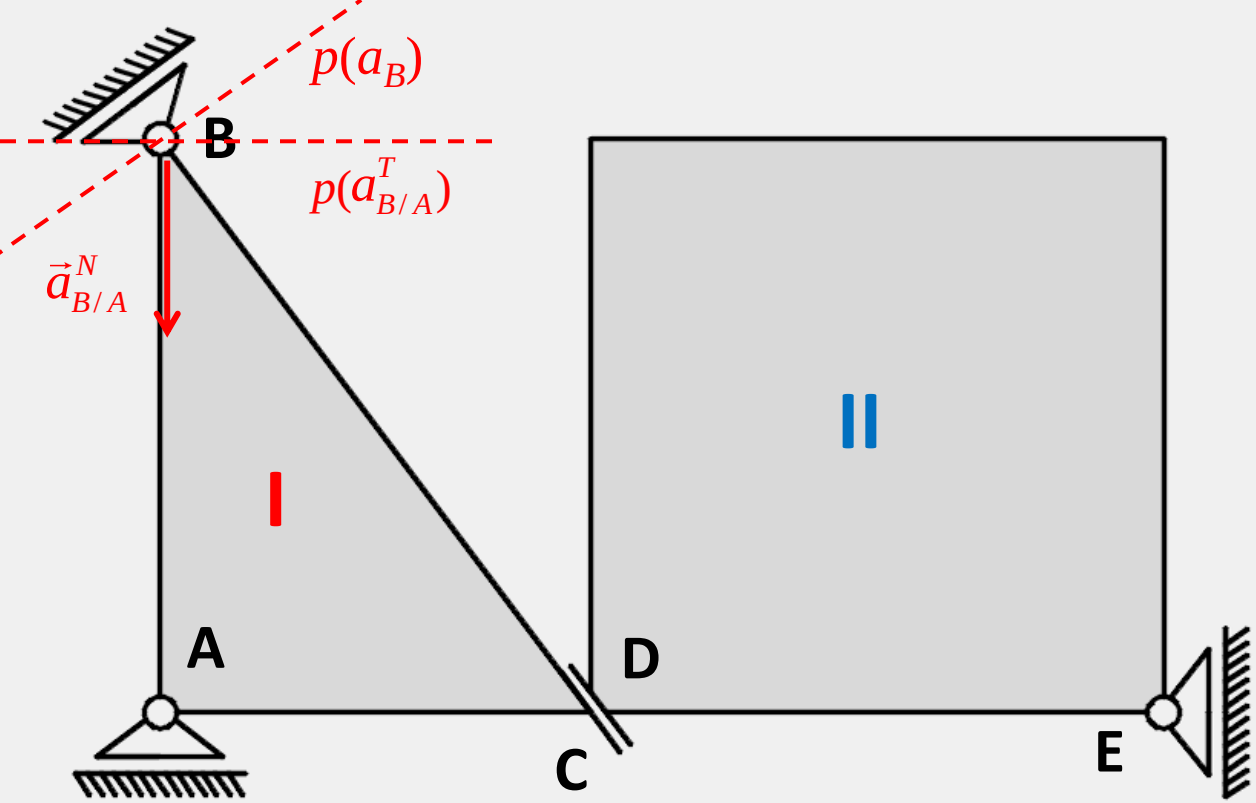

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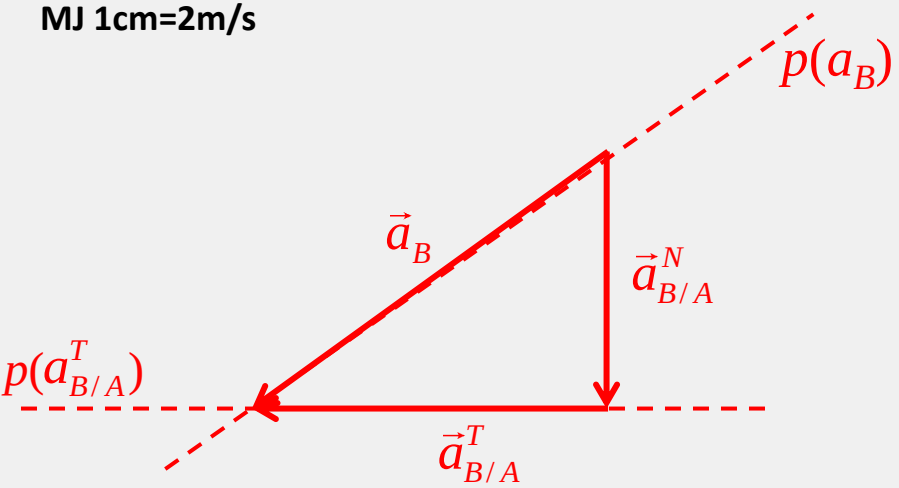

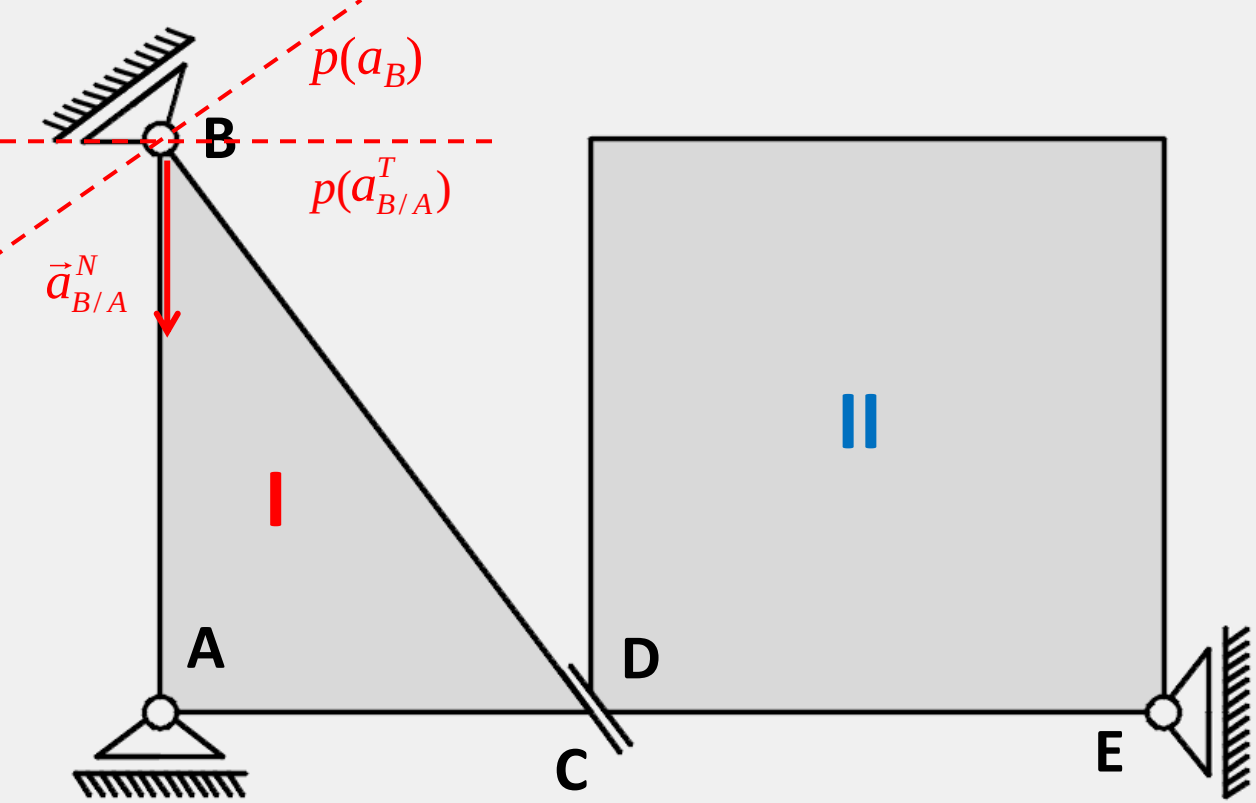

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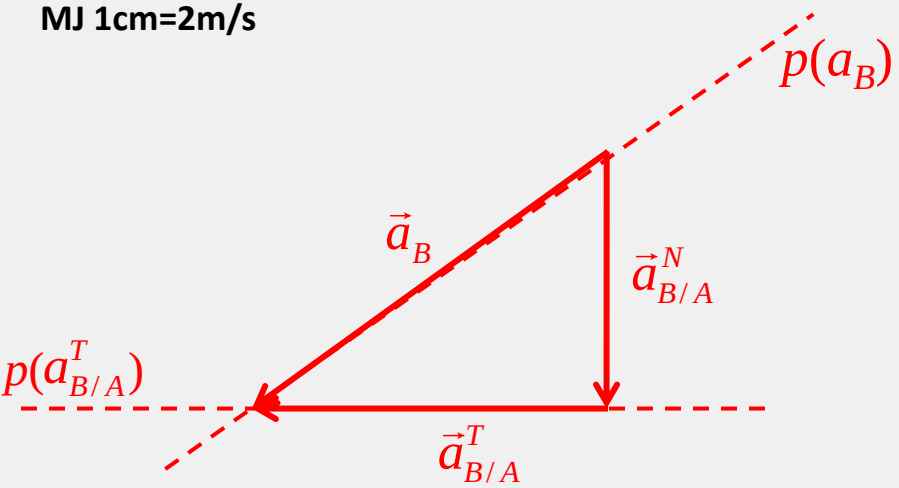
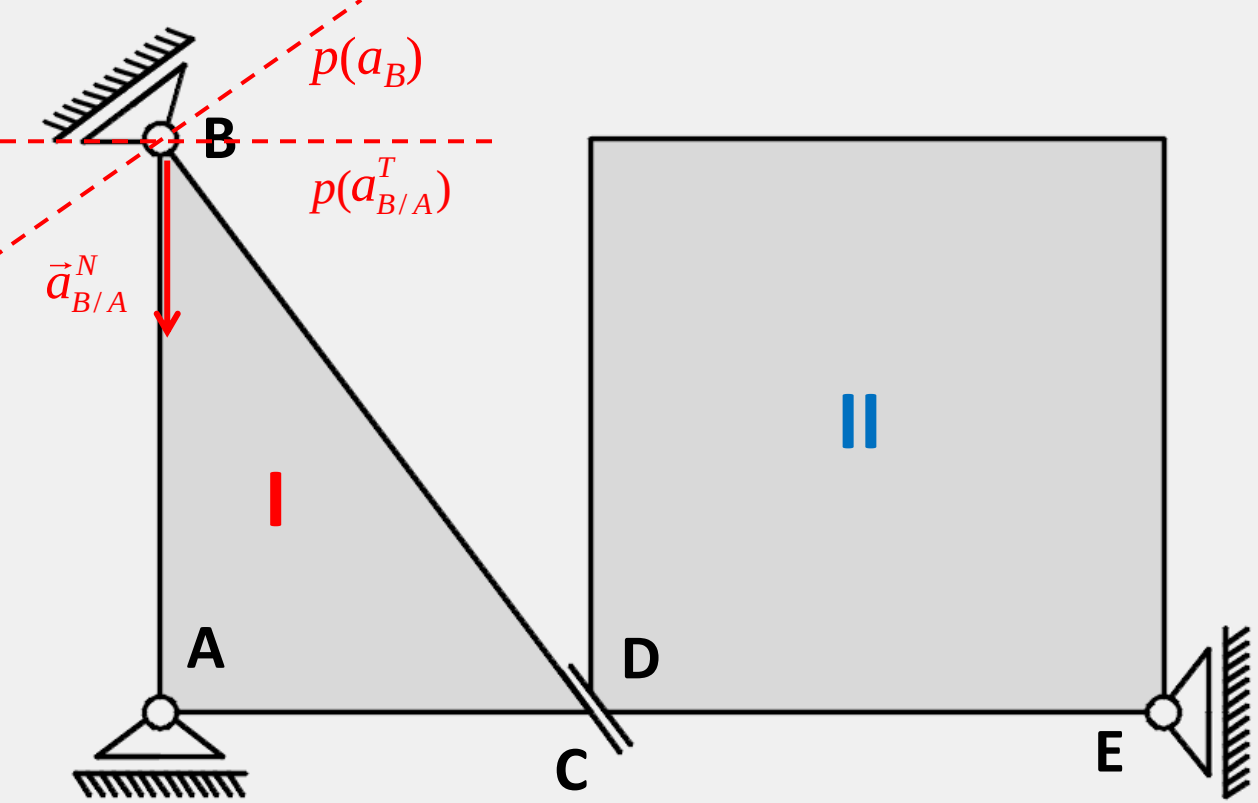


očitano:

$$a_B = 6,6\,cm = 13,2\ m/s^2 \qquad \vec{a}_B = -10,6\vec{i} - 8\vec{j}$$

$$a^T_{B/A} = 5,3\,cm = 10,6\ m/s^2$$



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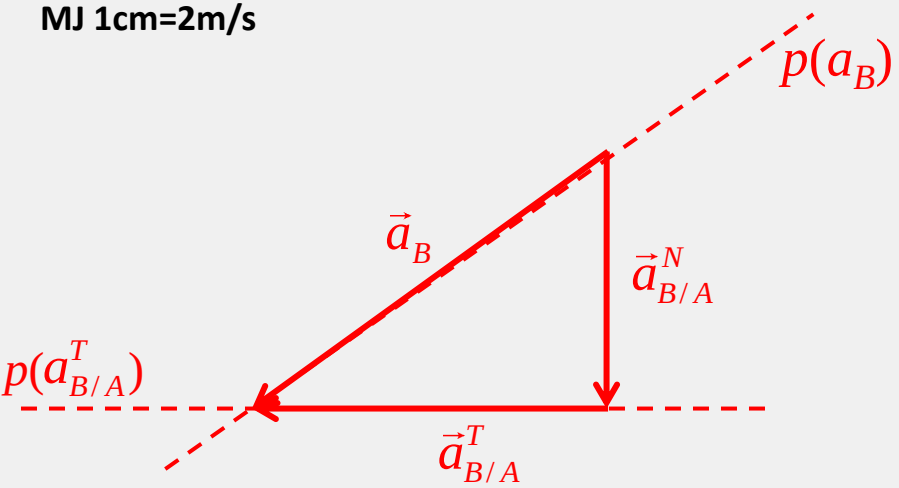

očitano:

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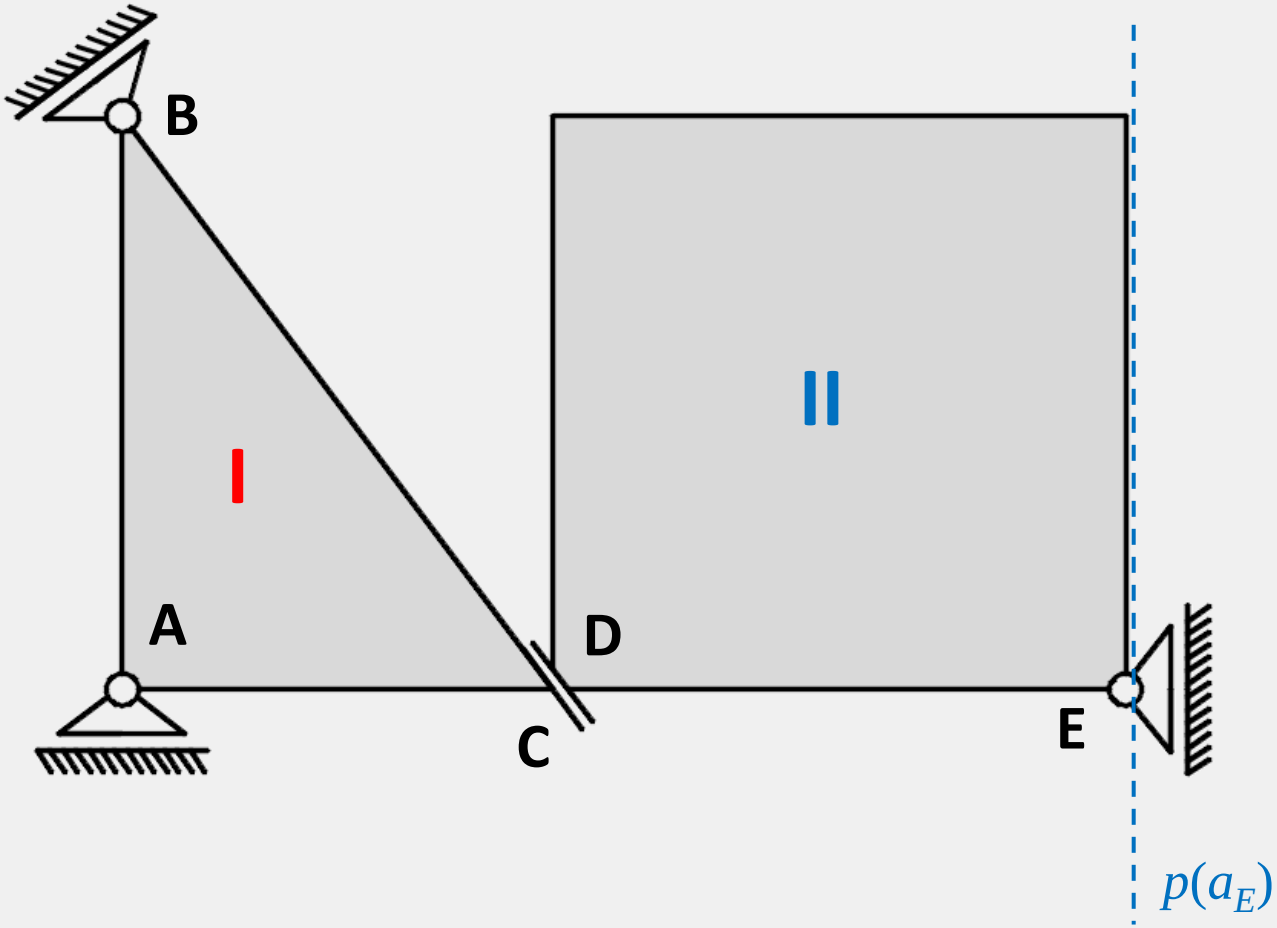
$$a^T_{B/A} = 5,3\,cm = 10,6\ m/s^2$$

$$\varepsilon_I = \frac{a^T_{B/A}}{\overline{AB}} = \frac{10,6}{2} = 5,3\ r/s^2 \qquad \vec{\varepsilon}_I = 5,3\vec{k}$$


B
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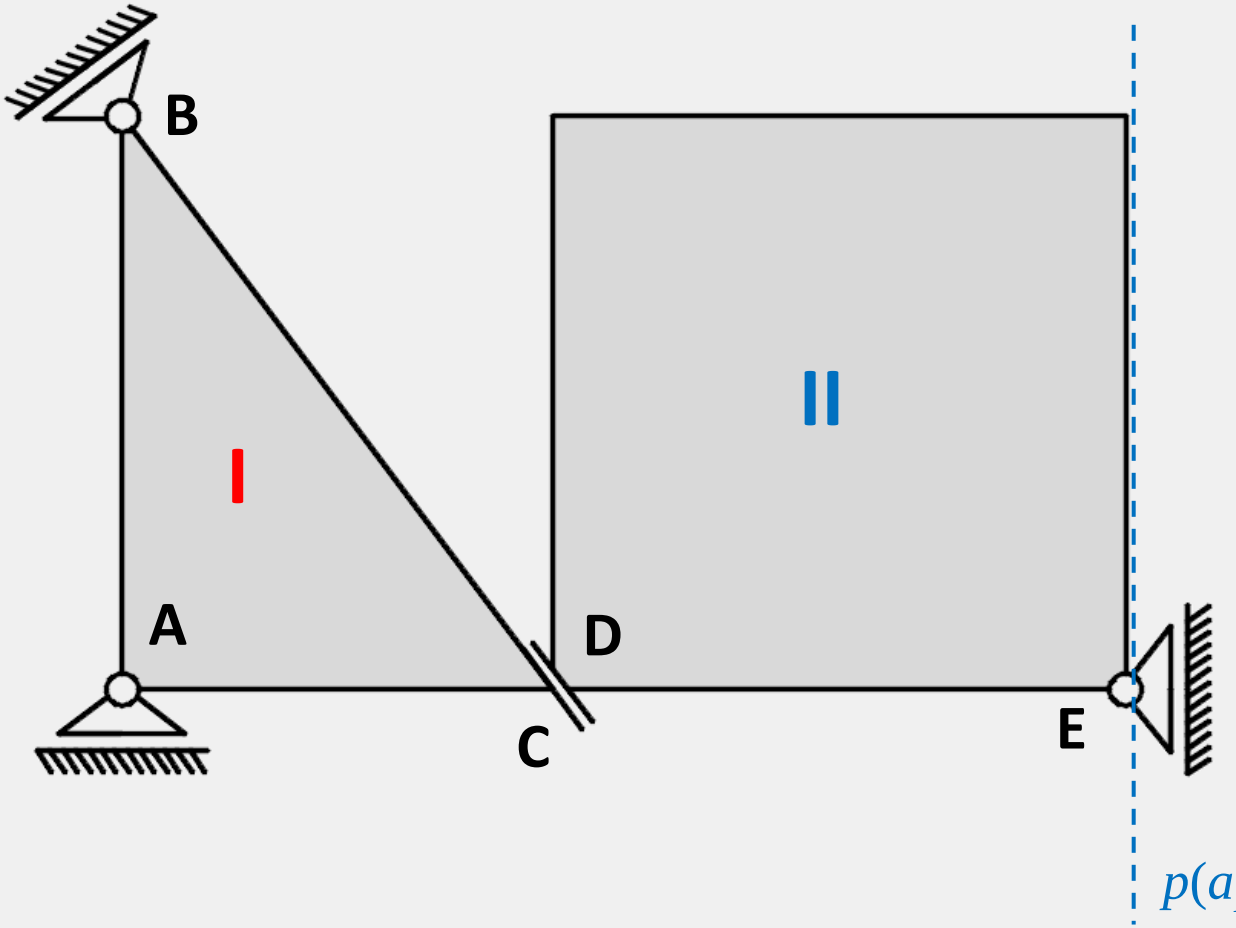
$p(a_E)$

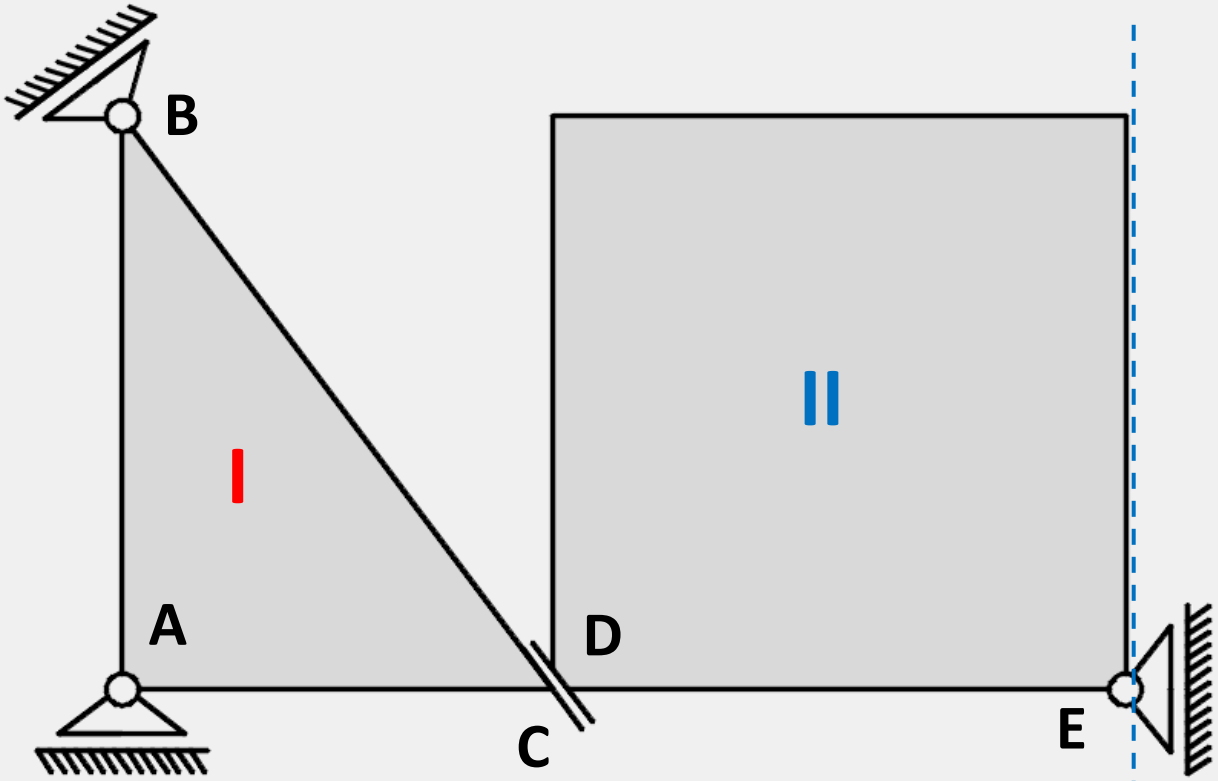


Uvjeti spoja tijela I i II

$$\vec{\varepsilon}_{II} = \vec{\varepsilon}_{I} = 5,3\vec{k}$$

$$\vec{a}_D = \vec{a}_C + \vec{a}_{rel} + \vec{a}_{cor}$$

$p(a_E)$



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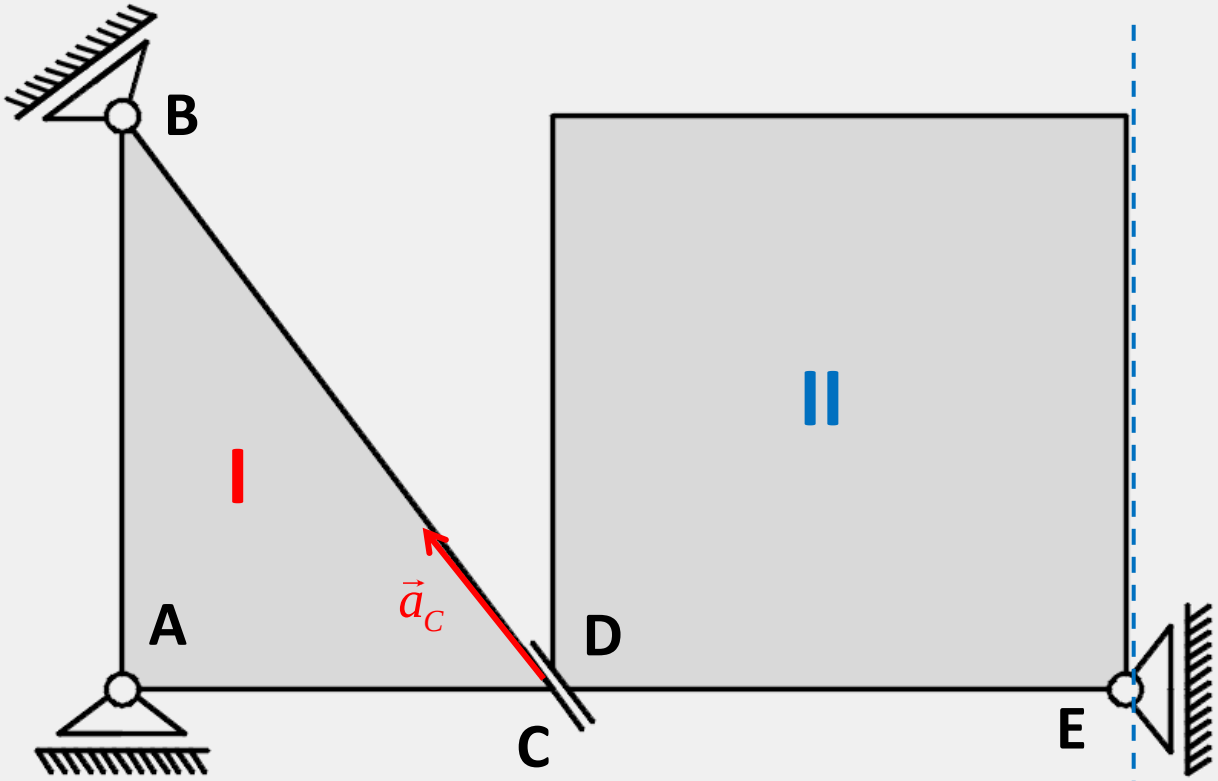
$p(a_E)$

$$\vec{a}_C = \cancel{\vec{a}_A} + \vec{a}^N_{C/A} + \vec{a}^T_{C/A}$$



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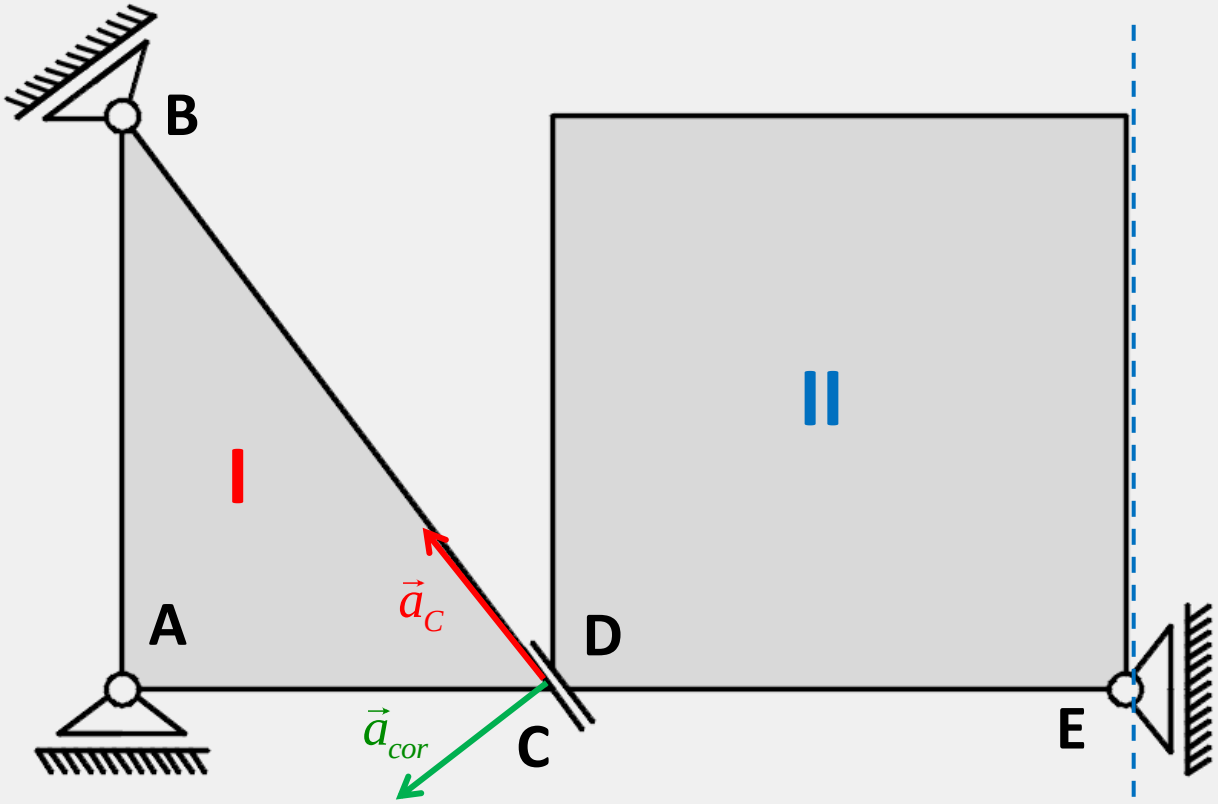
$p(a_E)$

$$\vec{a}_C = \cancel{\vec{a}_A} + \vec{a}^N_{C/A} + \vec{a}^T_{C/A}$$

$$\vec{a}_C = -1,5 \cdot 2^2 \vec{i} + 1,5 \cdot 5,3\vec{j} = -6\vec{i} + 7,95\vec{j}$$



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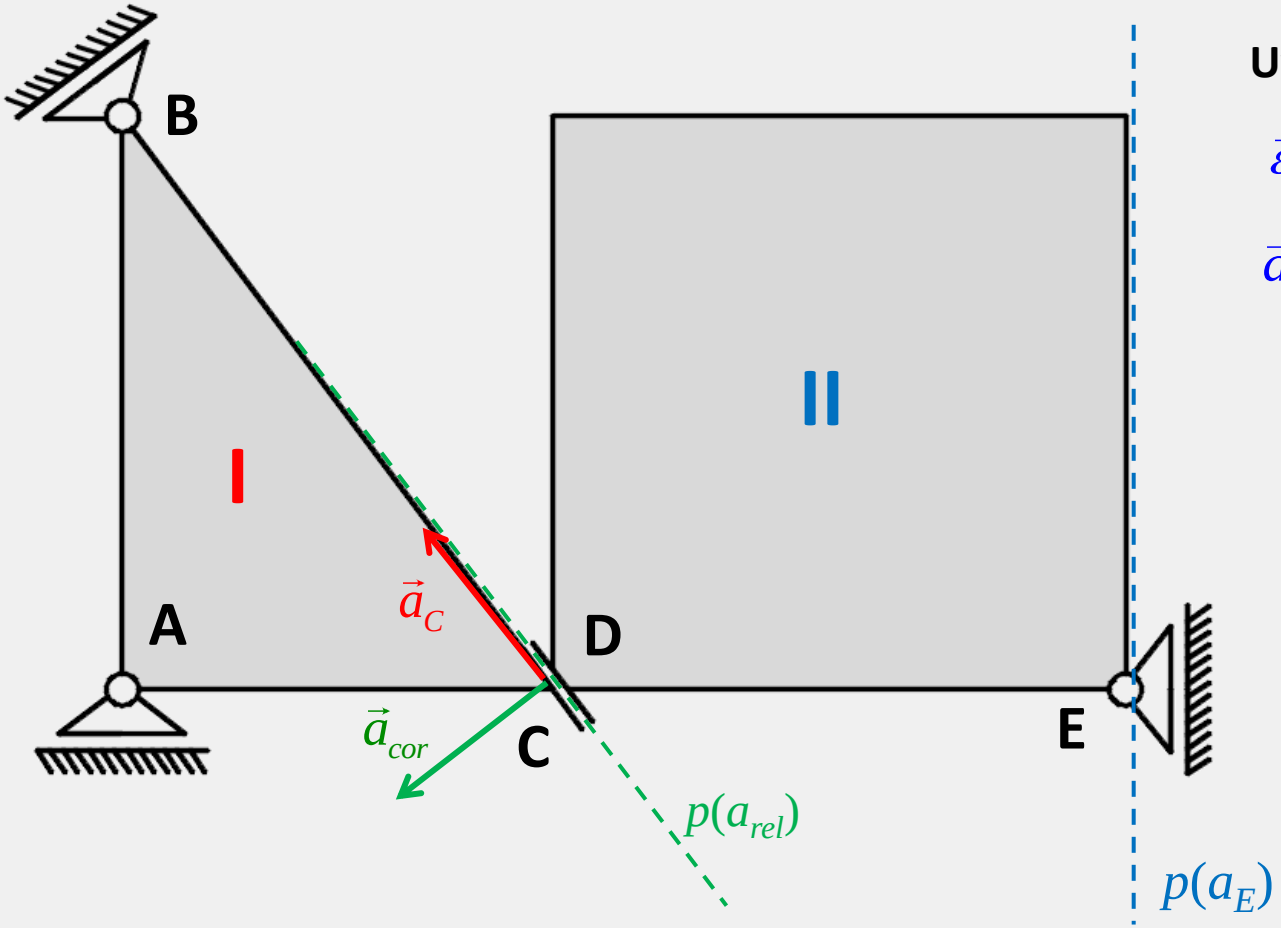
$$a_{cor} = 2 \cdot \omega \cdot v_{rel} = 27,2$$

$$\vec{a}_{cor} = -21,76\vec{i} - 16,32\vec{j}$$



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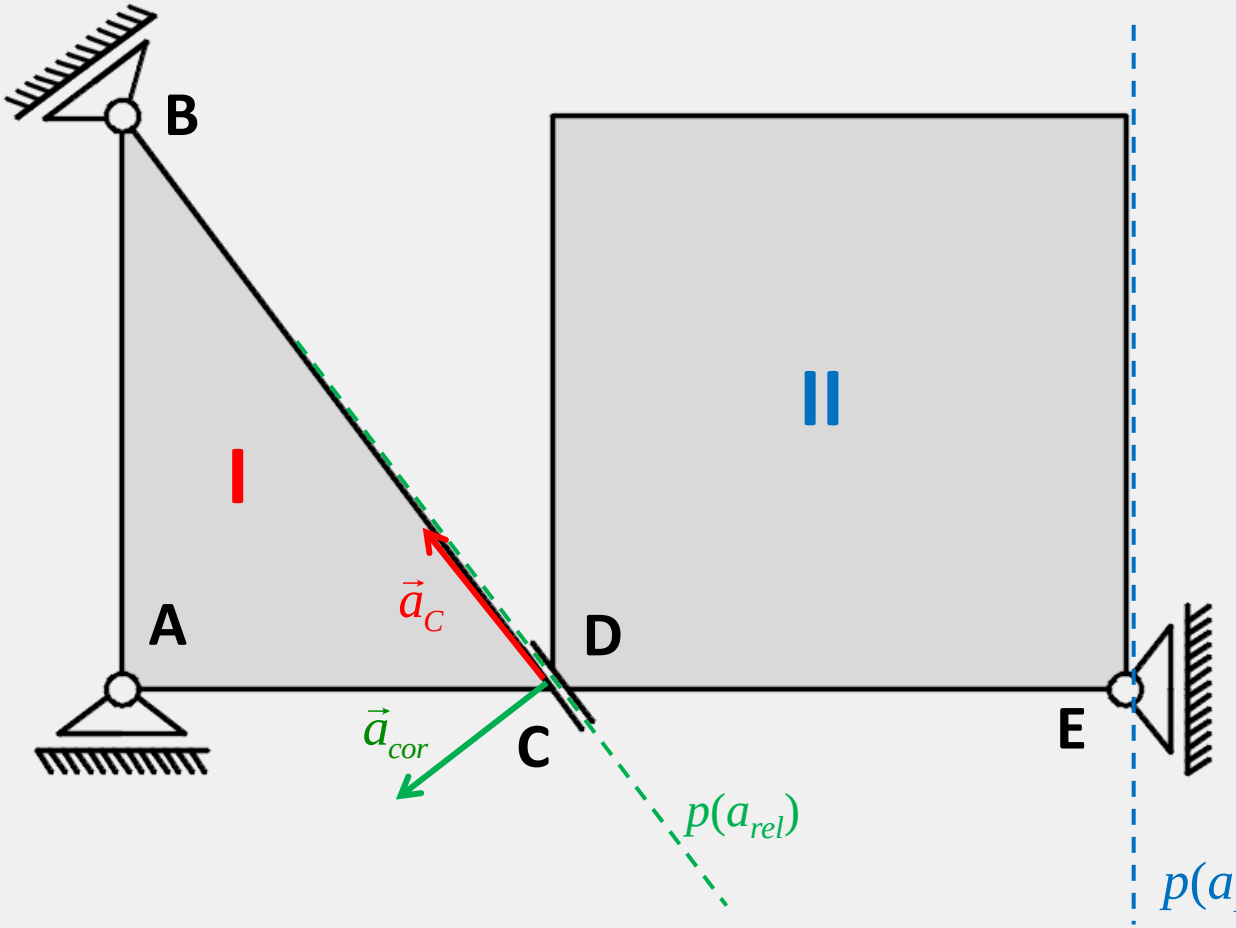

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Gibanje tijela II

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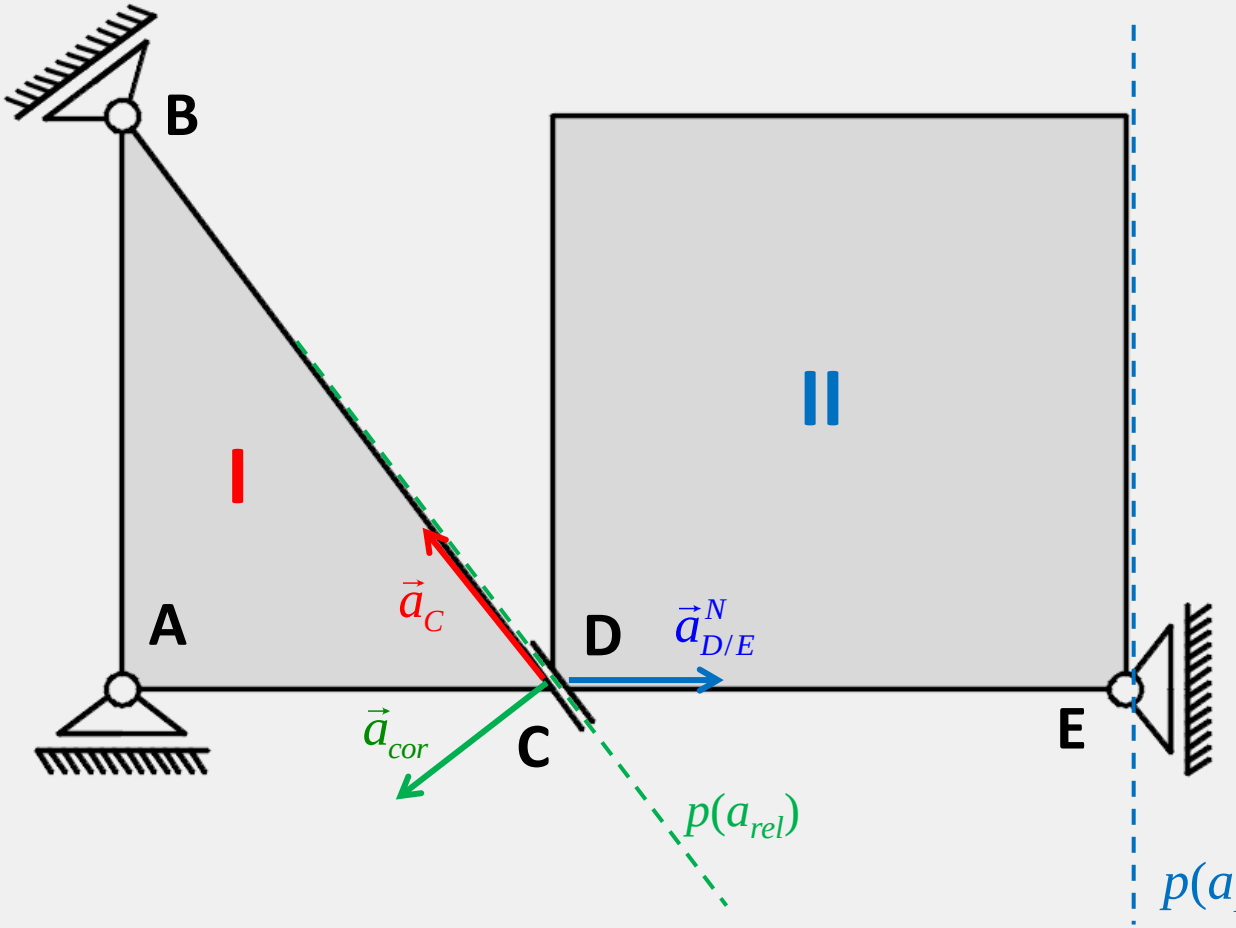

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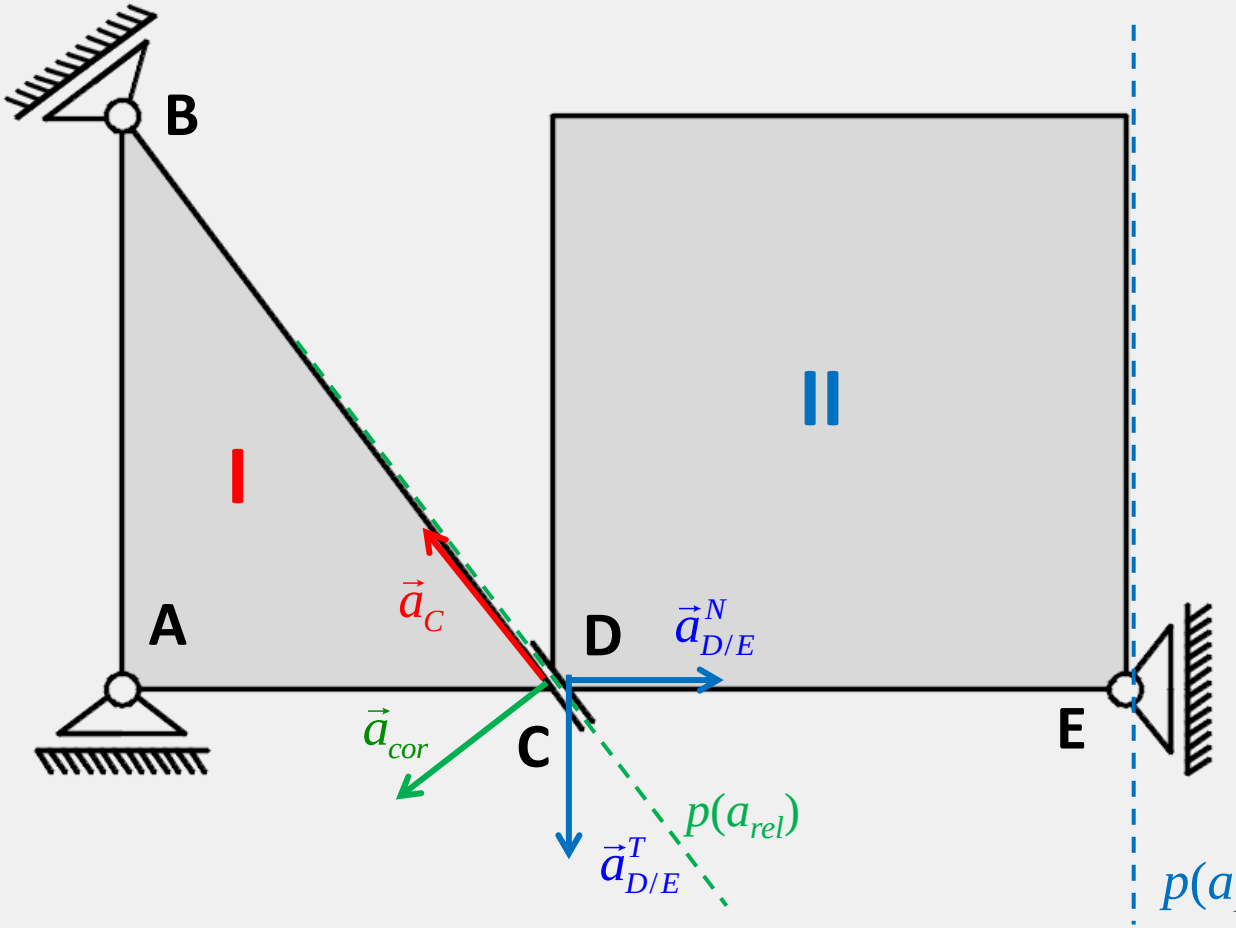
Gibanje tijela II

$$\vec{a}_D = \vec{a}_E + \vec{a}^N_{D/E} + \vec{a}^T_{D/E}$$

$$\vec{a}^N_{D/E} = 2 \cdot 2^2 = 8\vec{i}$$



Uvjeti spoja tijela I i II

$$\vec{\varepsilon}_{II} = \vec{\varepsilon}_I = 5,3\vec{k}$$

$$\vec{a}_D = \vec{a}_C + \vec{a}_{rel} + \vec{a}_{cor}$$

$$\vec{a}_C = \cancel{\vec{a}_A} + \vec{a}^N_{C/A} + \vec{a}^T_{C/A}$$

$$\vec{a}_C = -1,5 \cdot 2^2 \vec{i} + 1,5 \cdot 5,3\vec{j} = -6\vec{i} + 7,95\vec{j}$$

$$a_{cor} = 2 \cdot \omega \cdot v_{rel} = 27,2$$

$$\vec{a}_{cor} = -21,76\vec{i} - 16,32\vec{j}$$

Gibanje tijela II

$$\vec{a}_D = \vec{a}_E + \vec{a}^N_{D/E} + \vec{a}^T_{D/E}$$

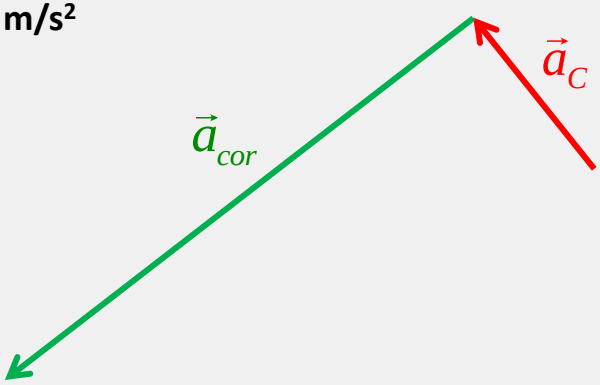
$$\vec{a}^N_{D/E} = 2 \cdot 2^2 = 8\vec{i}$$

$$\vec{a}^T_{D/E} = -2 \cdot 5,3 = -10,6\vec{j}$$

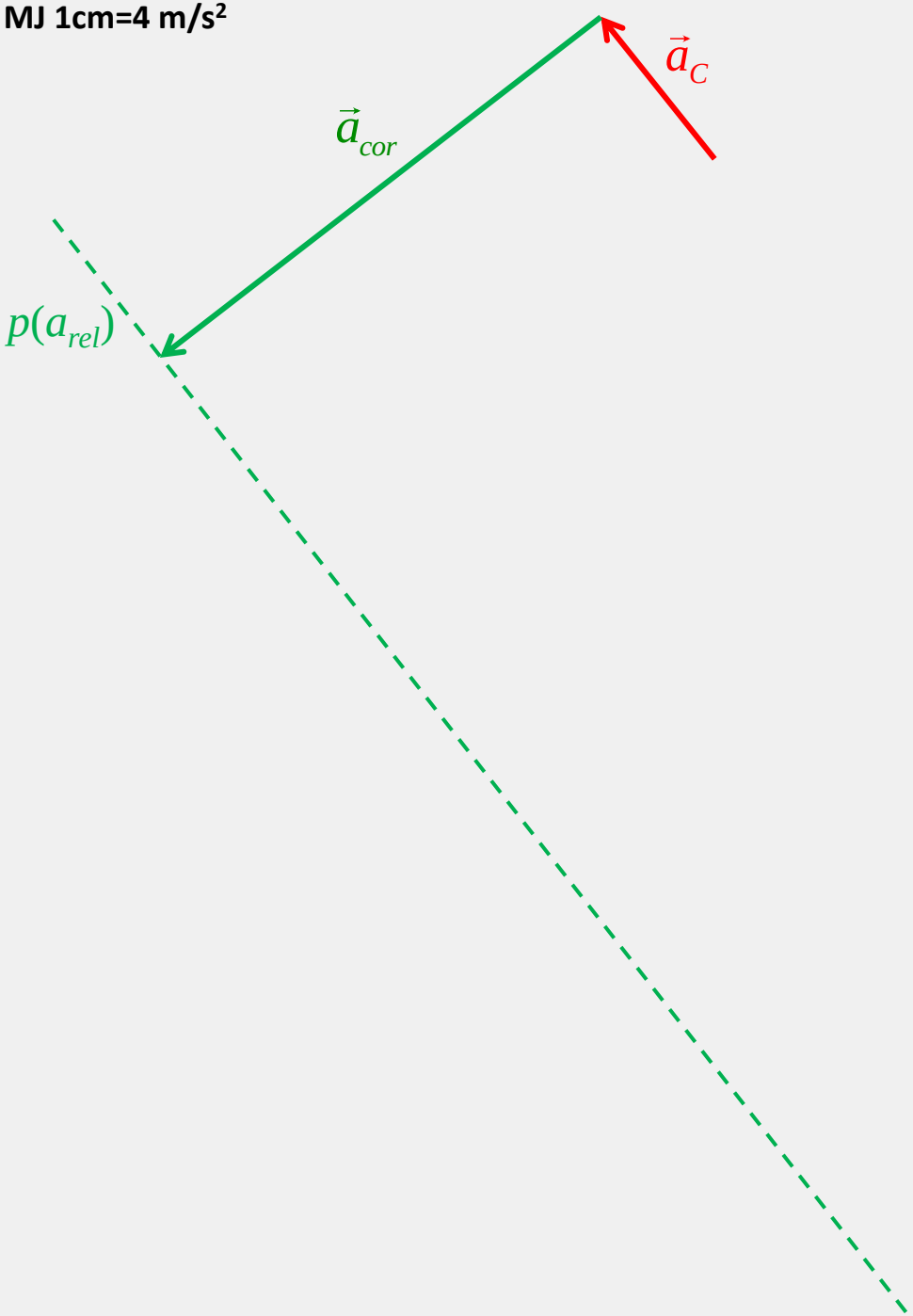
MJ 1cm=4 m/s^2

MJ 1cm=4 m/s²

MJ 1cm=4 m/s²



MJ 1cm=4 m/s²



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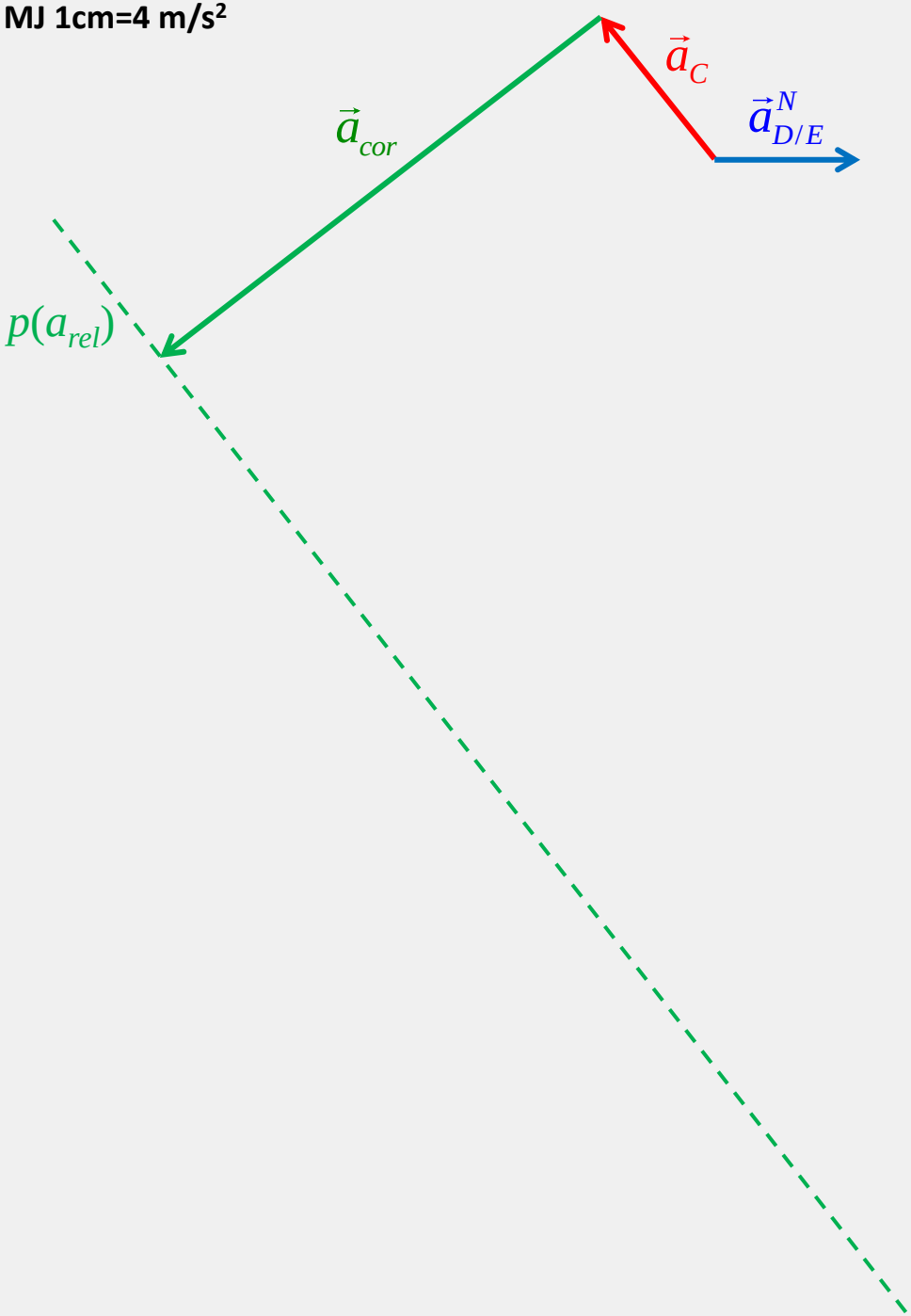
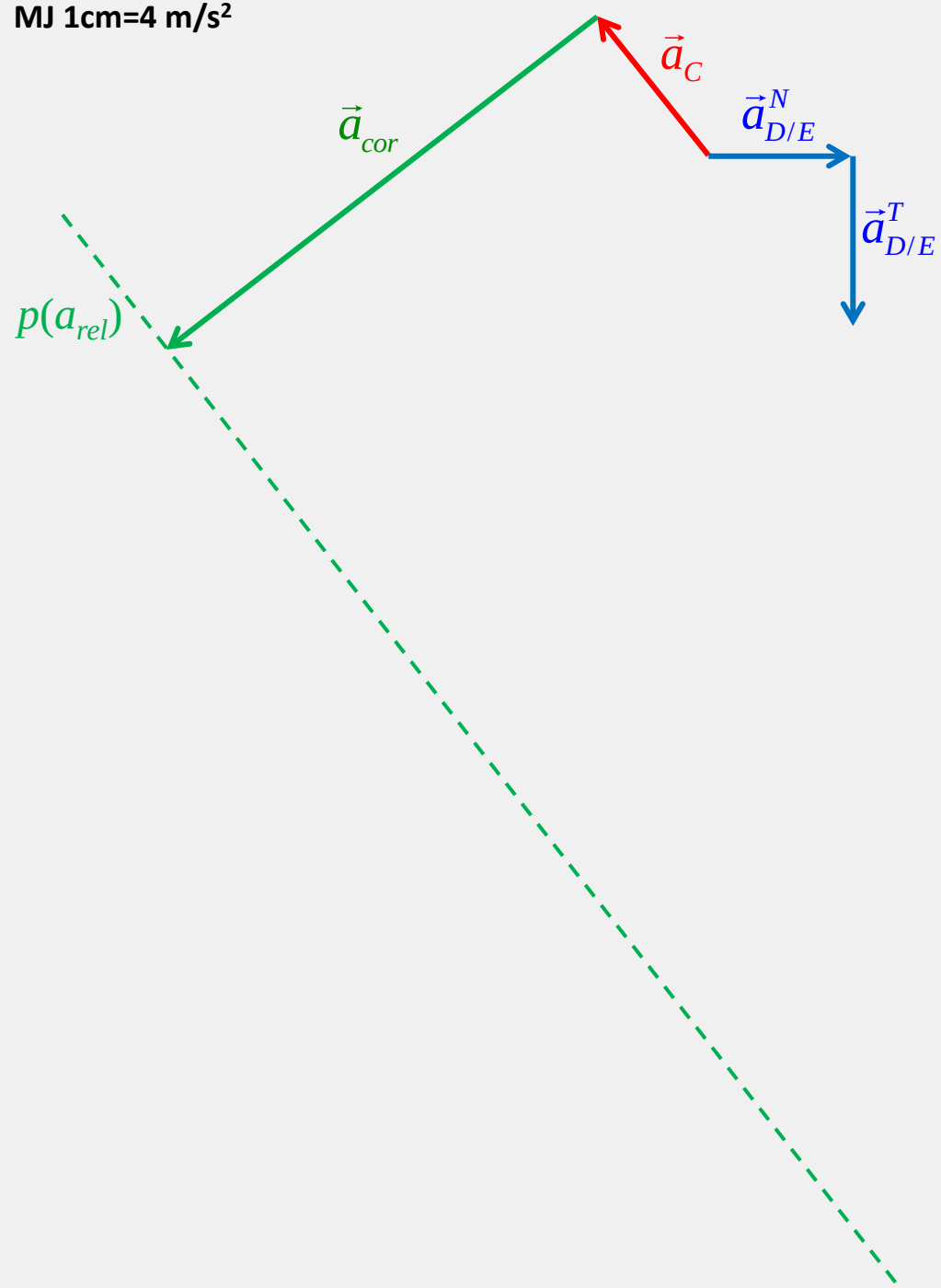
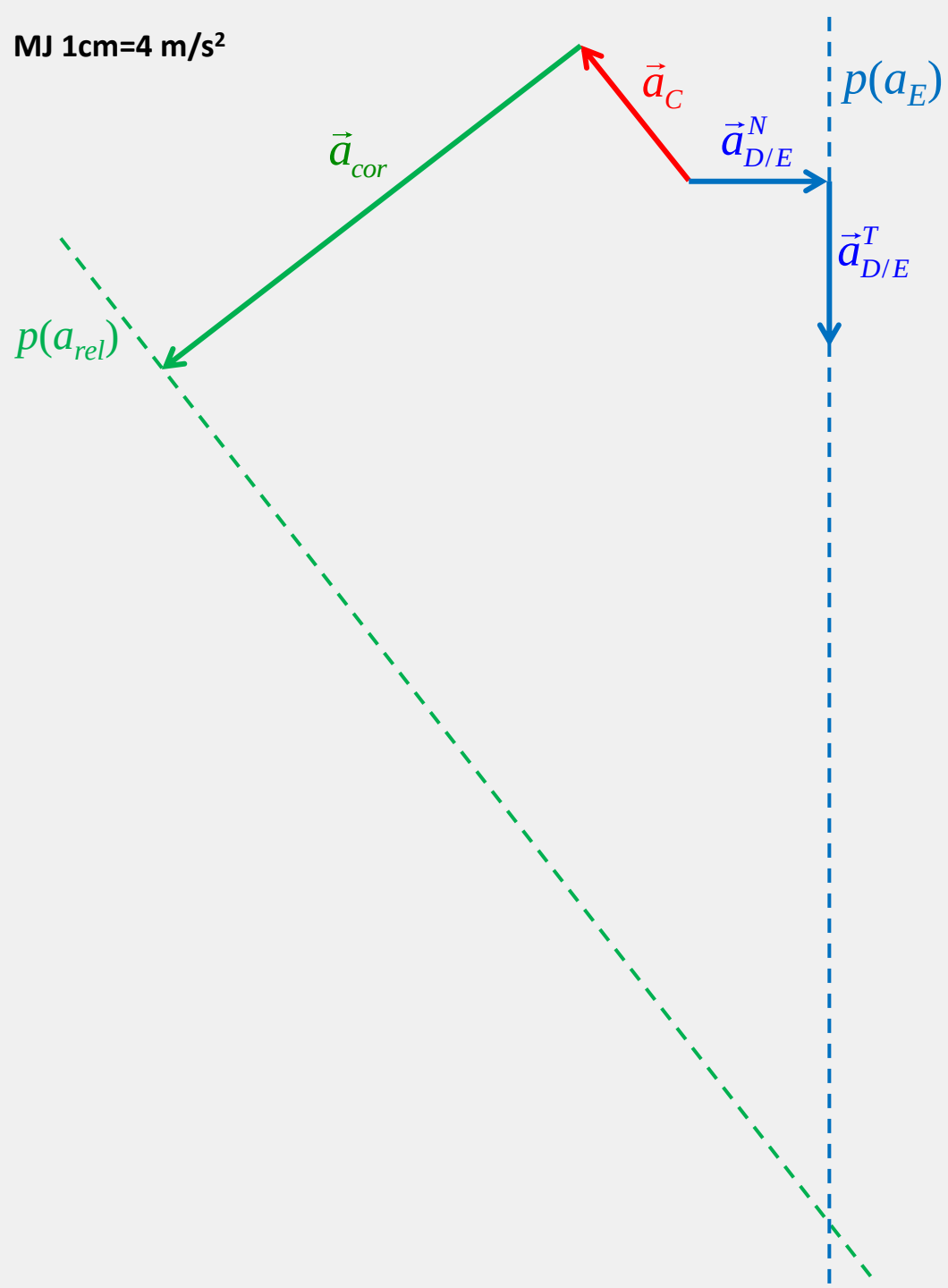


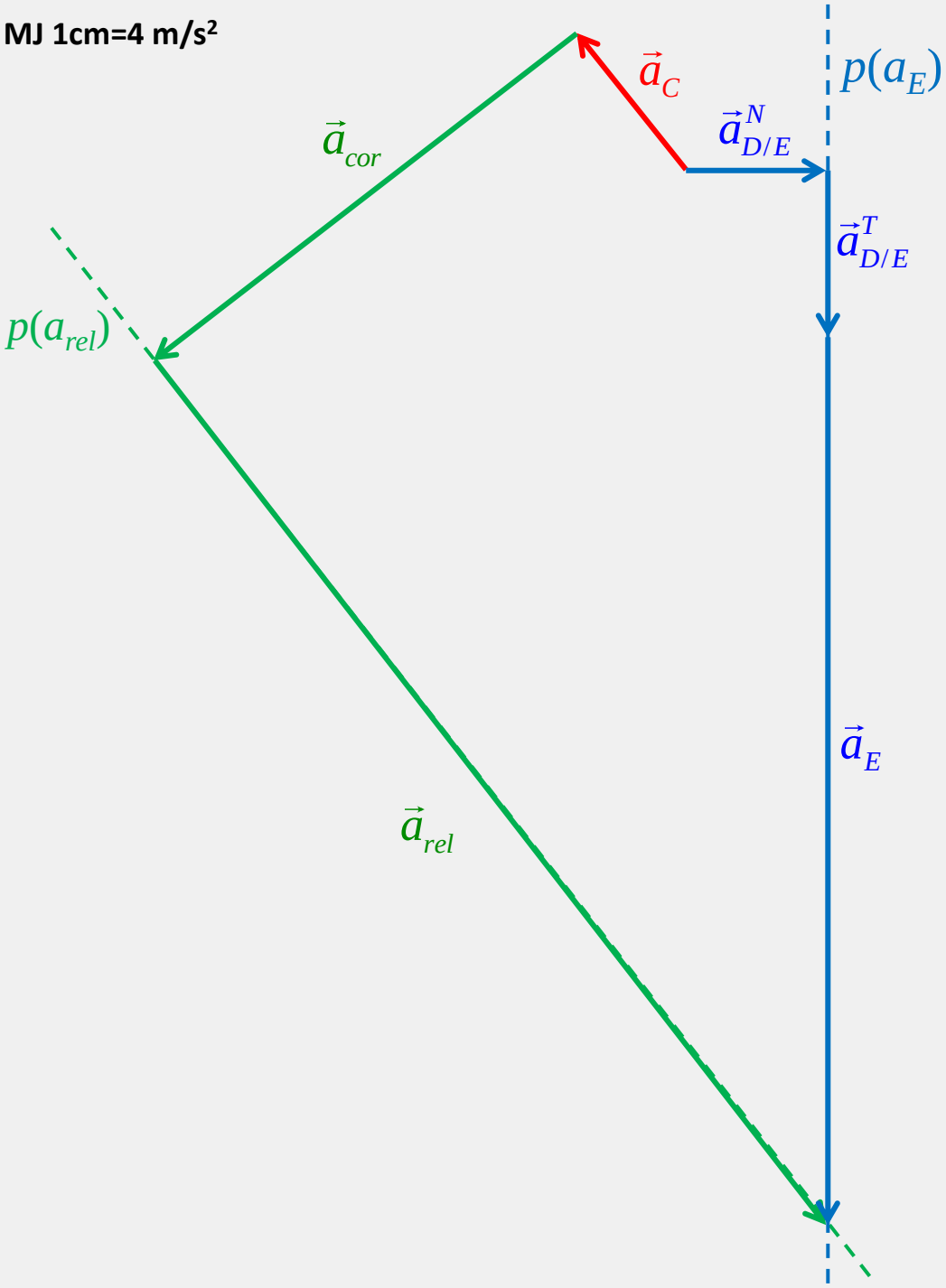
MJ 1cm=4 m/s²



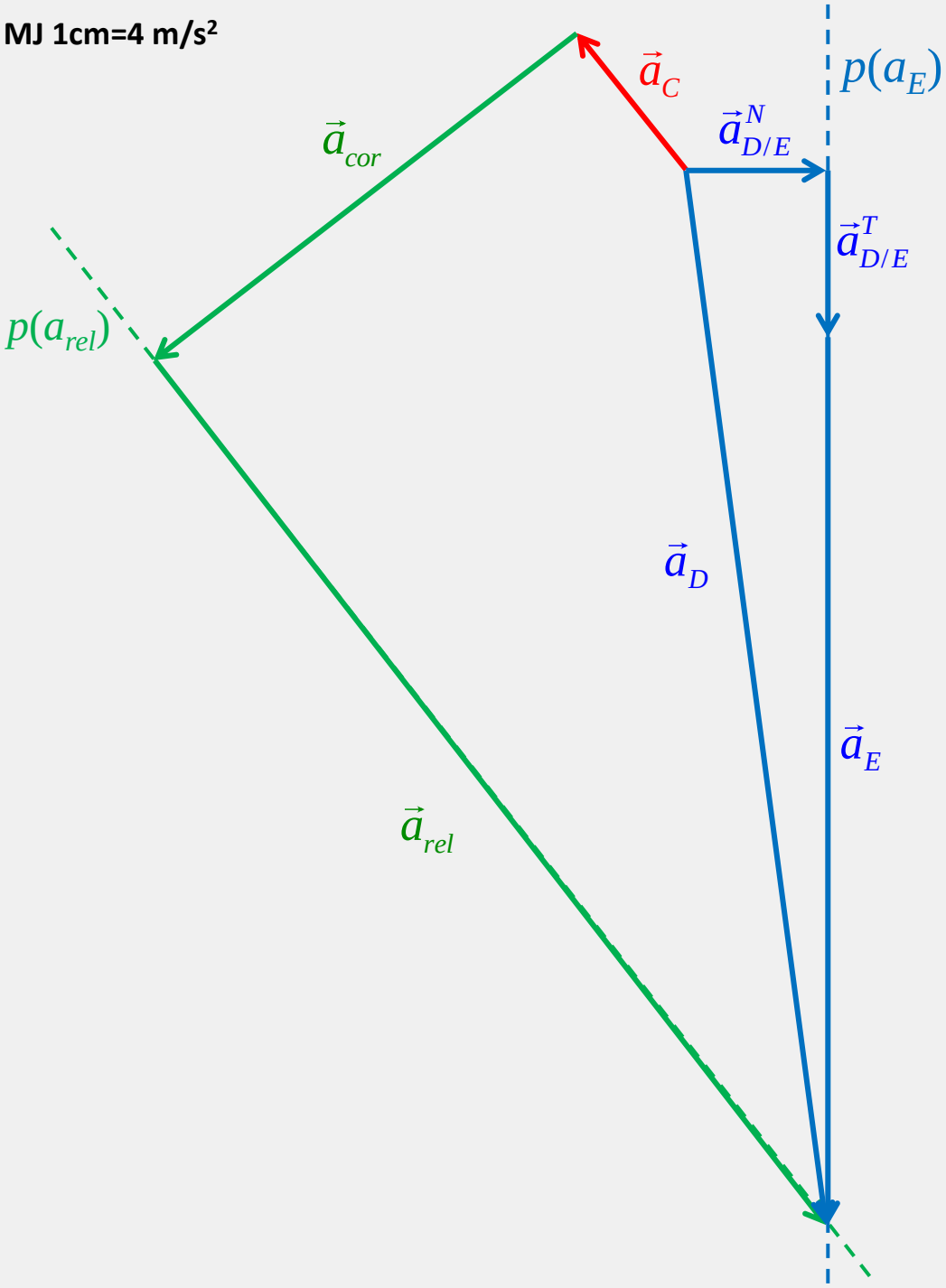
MJ 1cm=4 m/s²



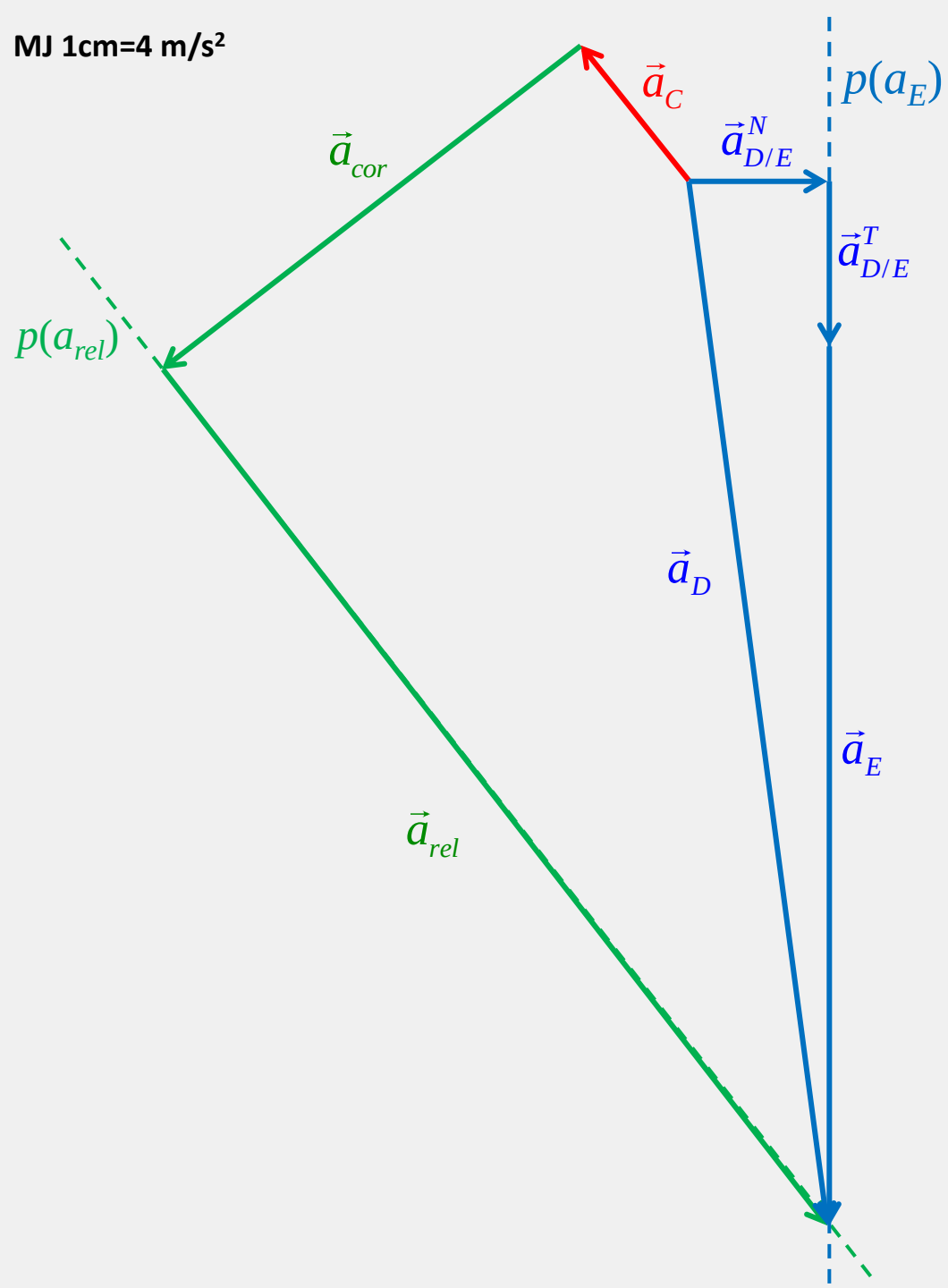
MJ 1cm=4 m/s²



MJ 1cm=4 m/s²


$\vec{a}_C$
$p(a_E)$
$\vec{a}_{cor}$
$\vec{a}^N_{D/E}$
$\vec{a}^T_{D/E}$
$p(a_{rel})$
$\vec{a}_D$
$\vec{a}_E$
$\vec{a}_{rel}$

MJ 1cm=4 m/s²



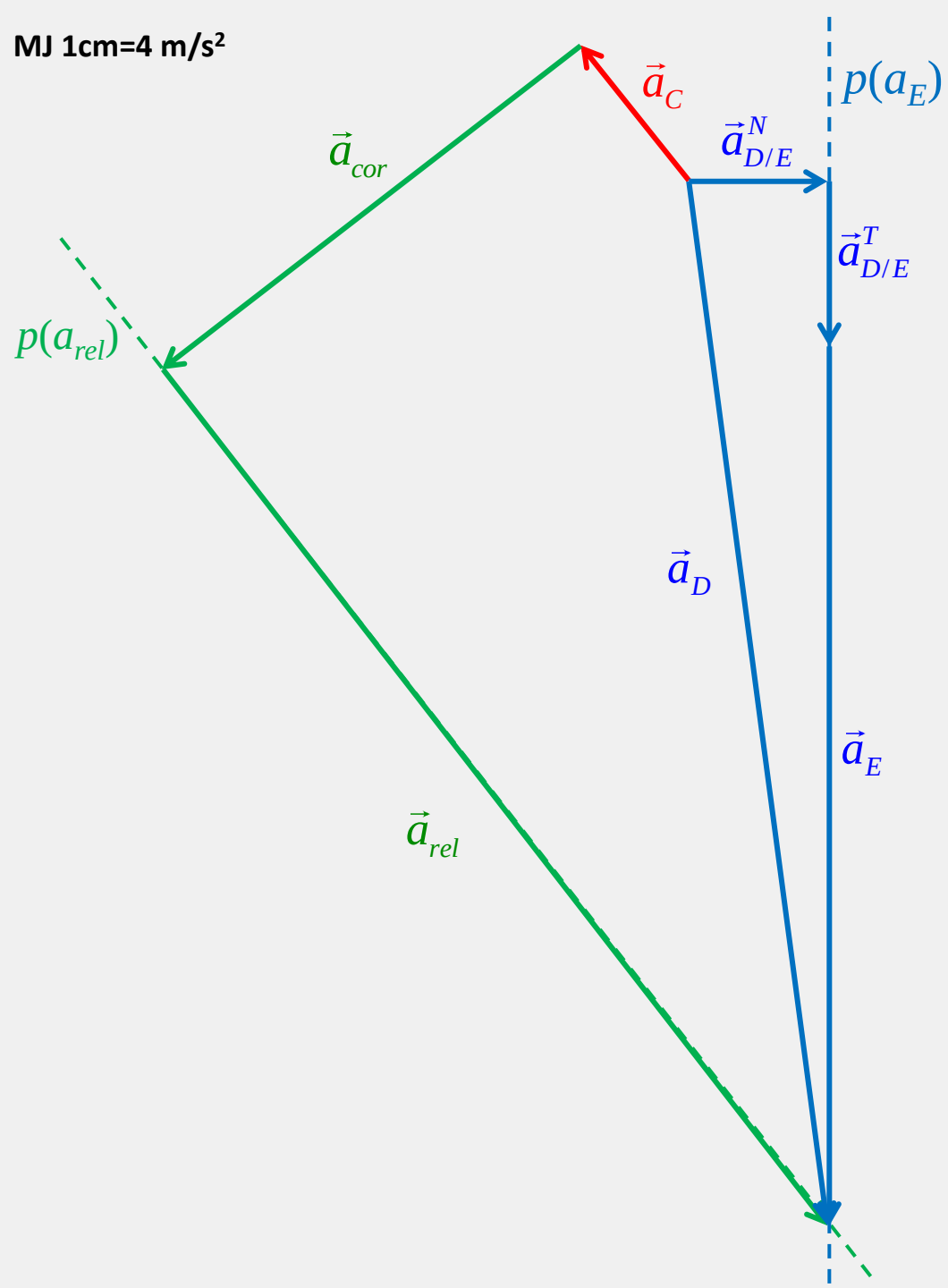
očitano:

$a_E = 11,7\,cm = 46,8\,m/s^2$

$a_{rel} = 15,35\,cm = 61,4\,m/s^2$

$a_D = 14,5\,cm = 58\,m/s^2$

MJ 1cm=4 m/s²



očitano:

$a_E = 11,7\,cm = 46,8\,m/s^2$

$a_{rel} = 15,35\,cm = 61,4\,m/s^2$

$a_D = 14,5\,cm = 58\,m/s^2$

$\vec{a}_E = -46,8\,\vec{j}$

$\vec{a}_D = 8\vec{i} - 57,4\,\vec{j}$

ANALITIČKA RJEŠENJA ZADATKA

$\vec{v}_B = \vec{0}$ $\quad v_B = 0\,m/s$

$\vec{v}_C = -4\vec{i} - 3\vec{j}$ $\quad v_C = 5\,m/s$

$\vec{\omega}_I = -2\vec{k}$

$\vec{v}_{rel} = 4\vec{i} - 5{,}33\vec{j}$ $\quad v_{rel} = 6{,}667\,m/s$

$\vec{v}_E = -12{,}33\,\vec{j}$ $\quad v_E = 12{,}33\ m/s$

$\vec{v}_D = -8{,}33\,\vec{j}$ $\quad v_D = 8{,}33\ m/s$

$\vec{\omega}_{II} = \vec{\omega}_I = -2\vec{k}$

$\vec{a}_B = -10{,}667\vec{i} - 8\vec{j}$ $\quad a_B = 13{,}33\ m/s^2$

$\vec{a}_C = -6\vec{i} + 8\vec{j}$ $\quad a_C = 10\ m/s^2$

$\vec{a}_{cor} = -21{,}33\vec{i} - 16\vec{j}$ $\quad a_{cor} = 26{,}667\ m/s^2$

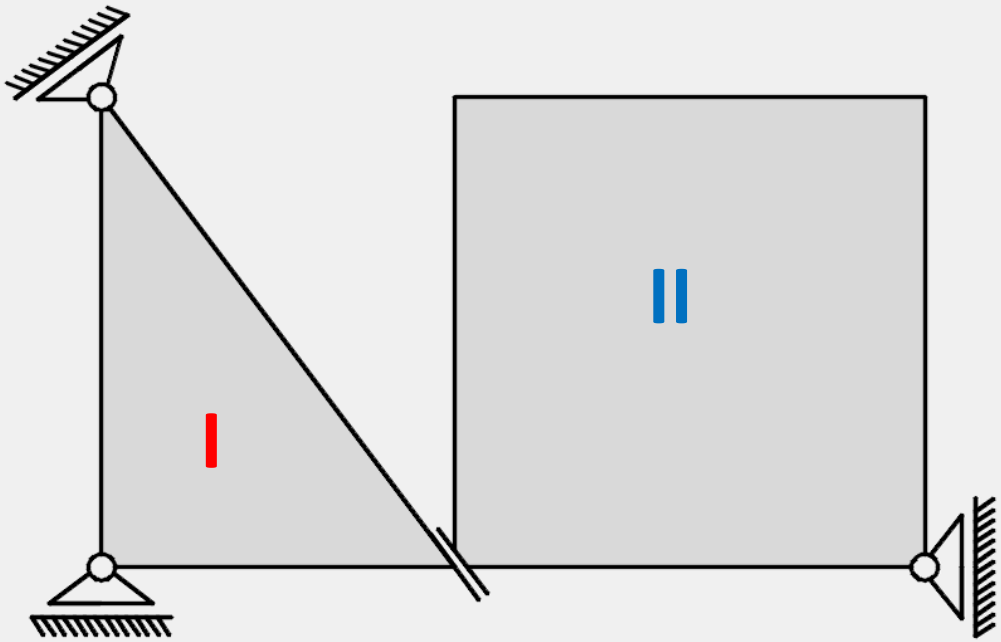
$\vec{a}_{rel} = 35{,}33\vec{i} - 47{,}11\vec{j}$ $\quad a_{rel} = 58{,}89\,m/s^2$

$\vec{a}_E = -44{,}44\,\vec{j}$ $\quad a_E = 44{,}44\ m/s^2$

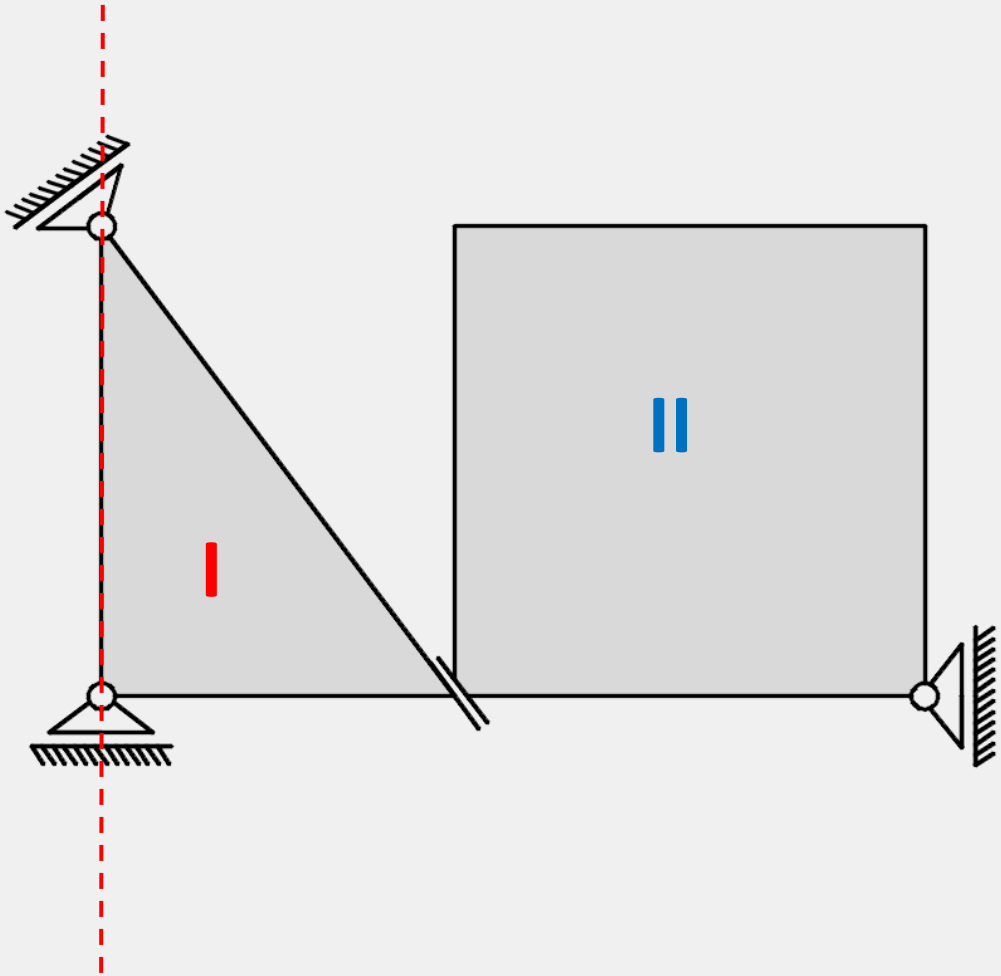
$\vec{a}_D = 8\vec{i} - 55{,}11\,\vec{j}$ $\quad a_D = 55{,}59\ m/s^2$

$\vec{\varepsilon}_{II} = \vec{\varepsilon}_I = 5{,}33\vec{k}$

ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA



ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA



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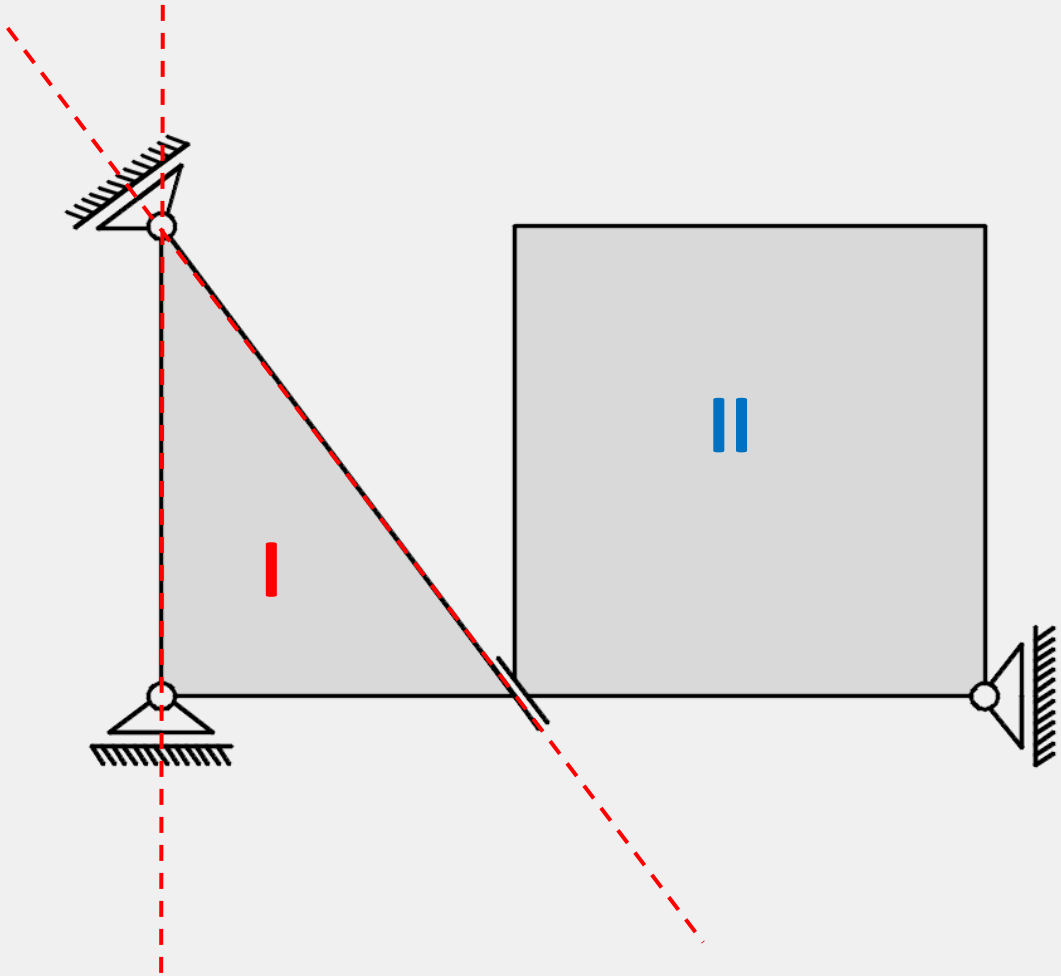

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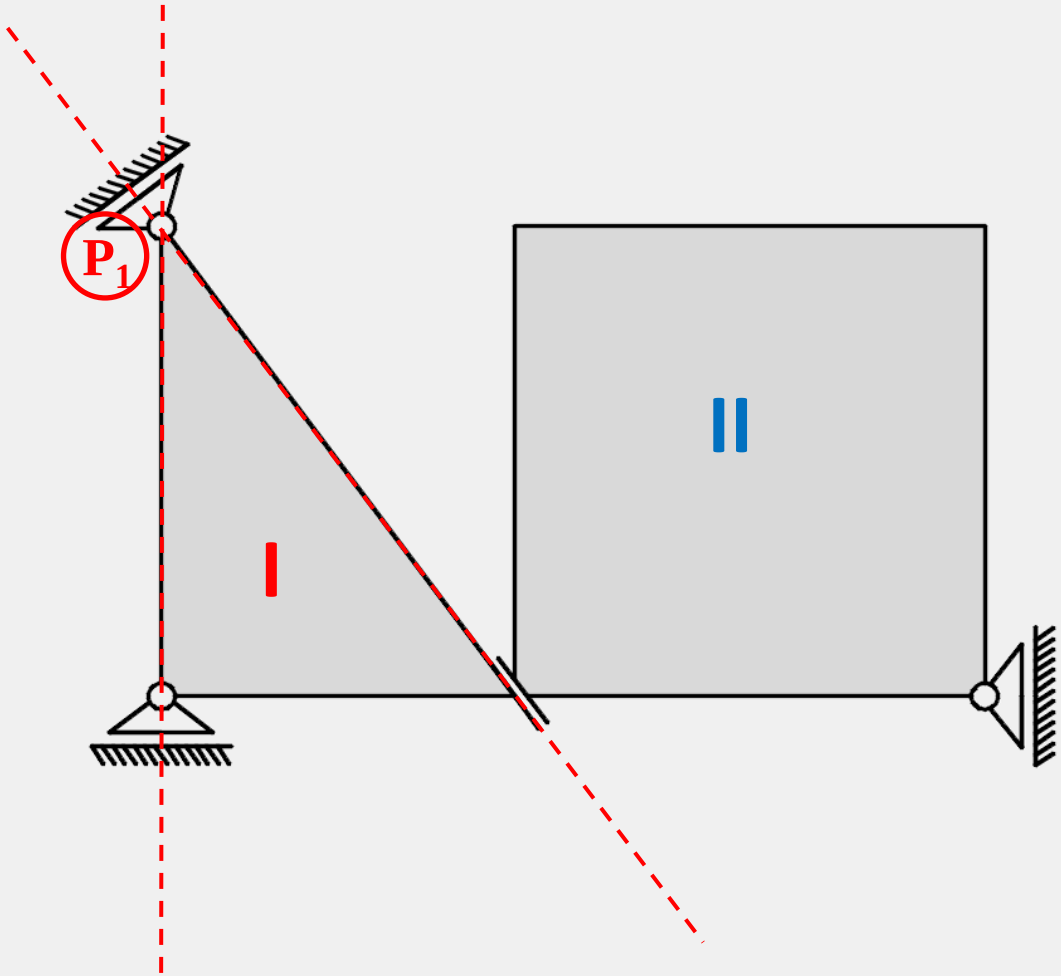

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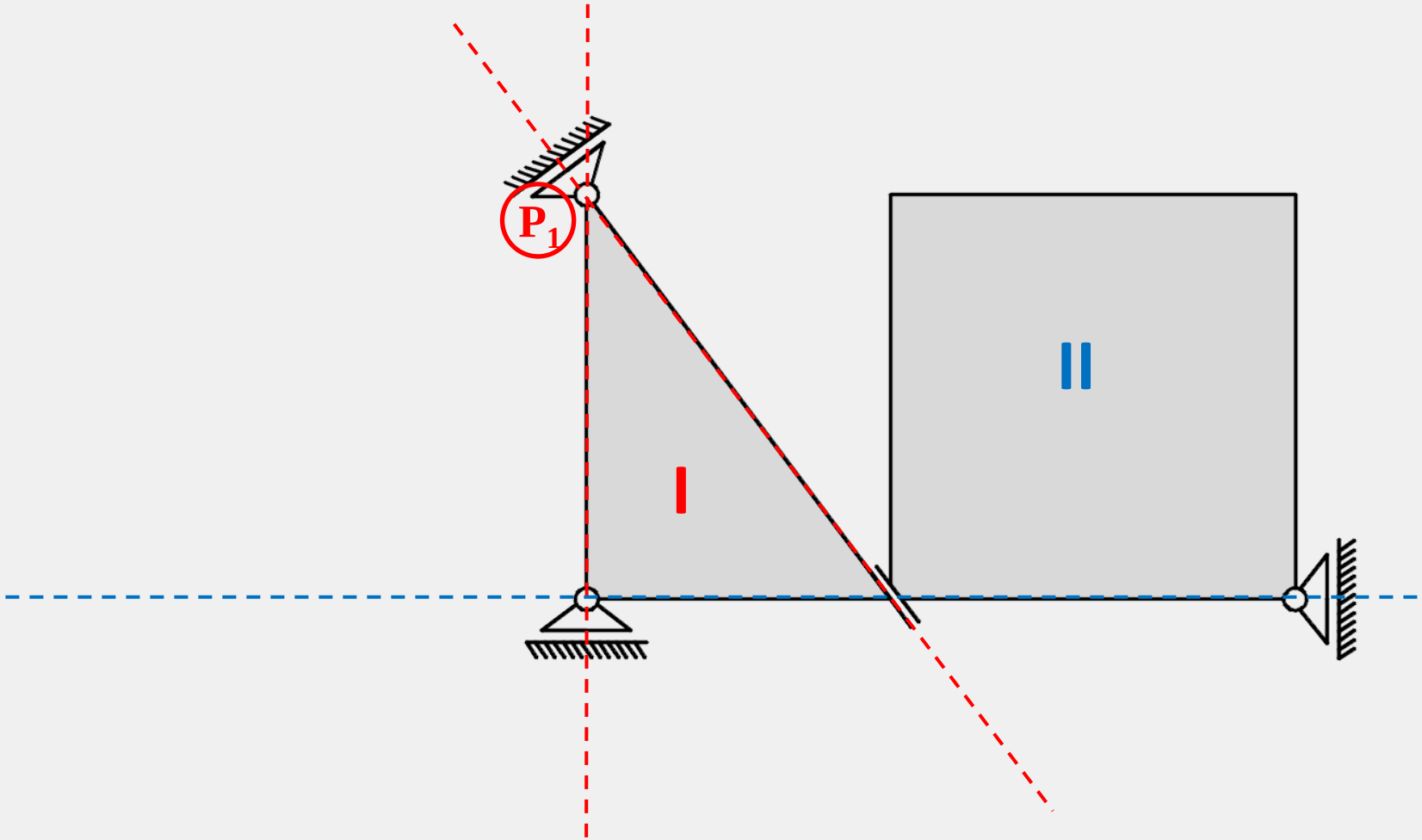

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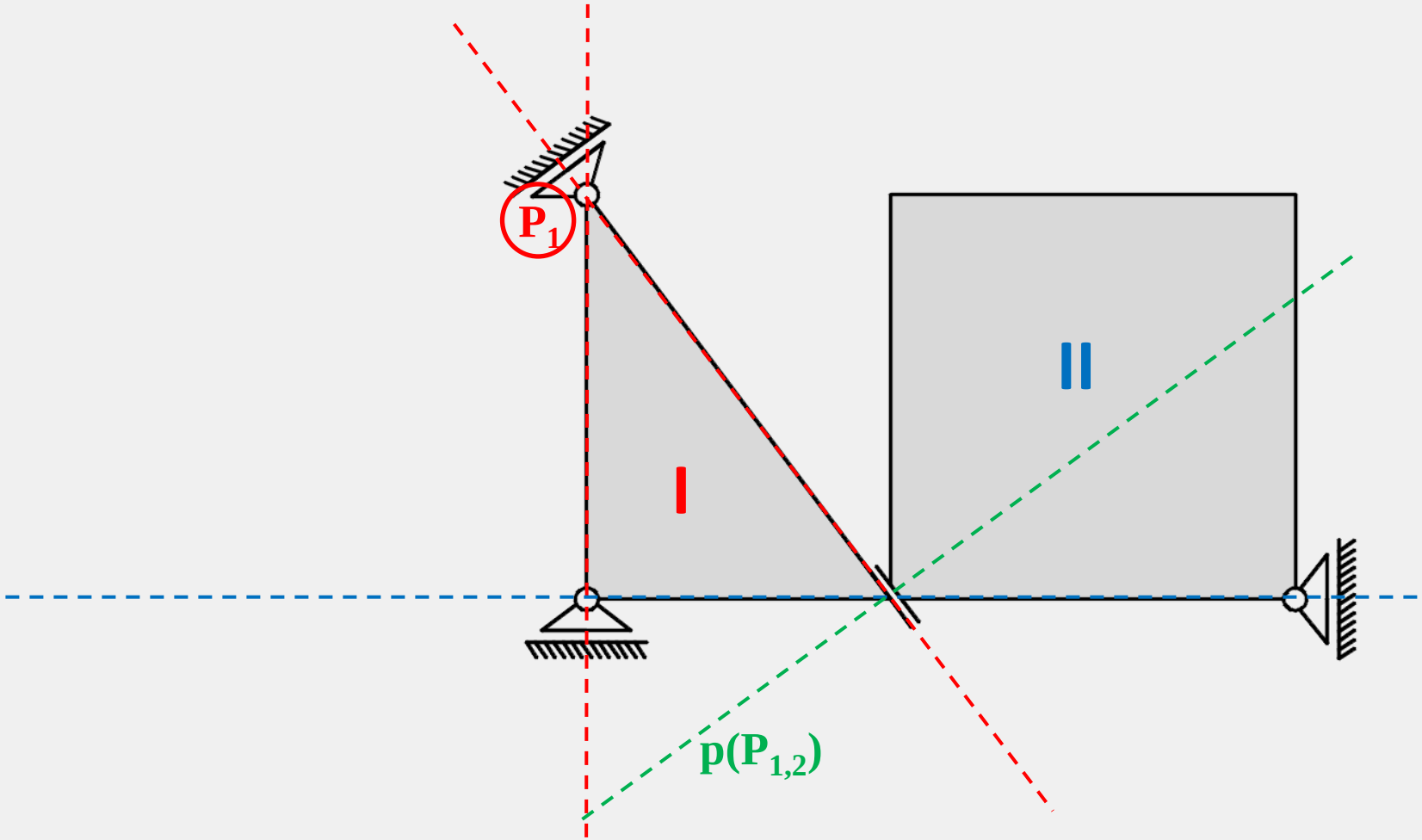

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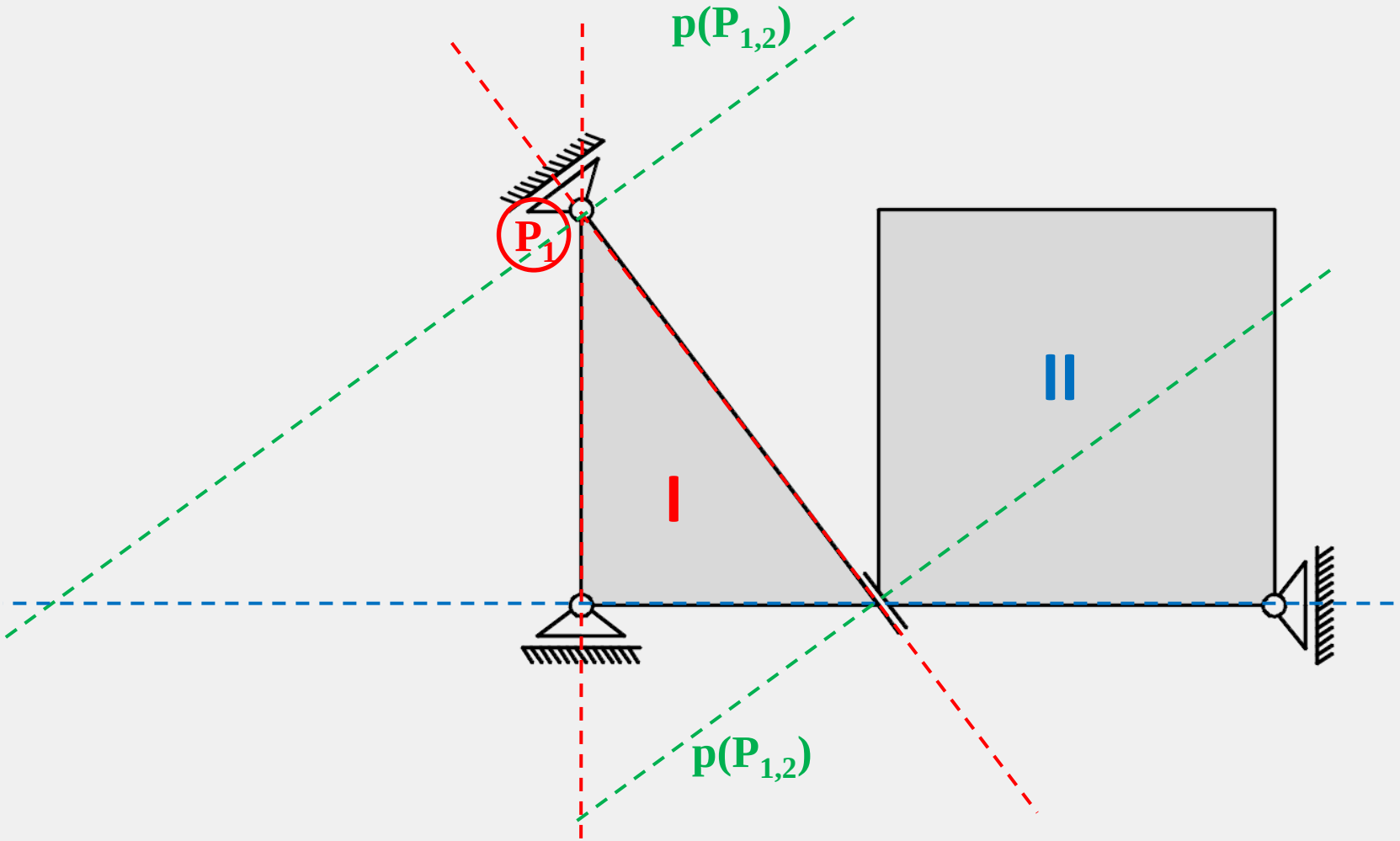

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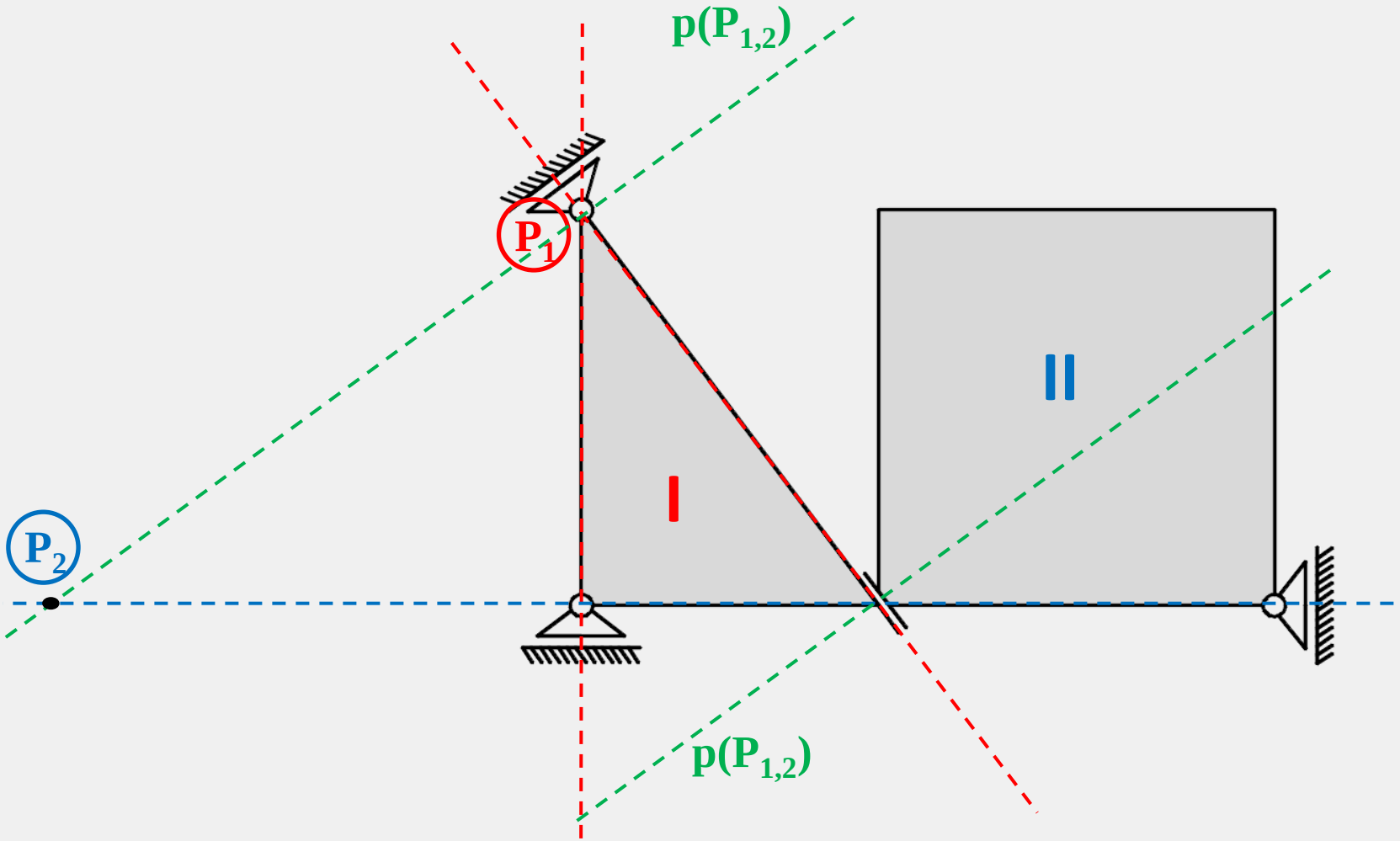

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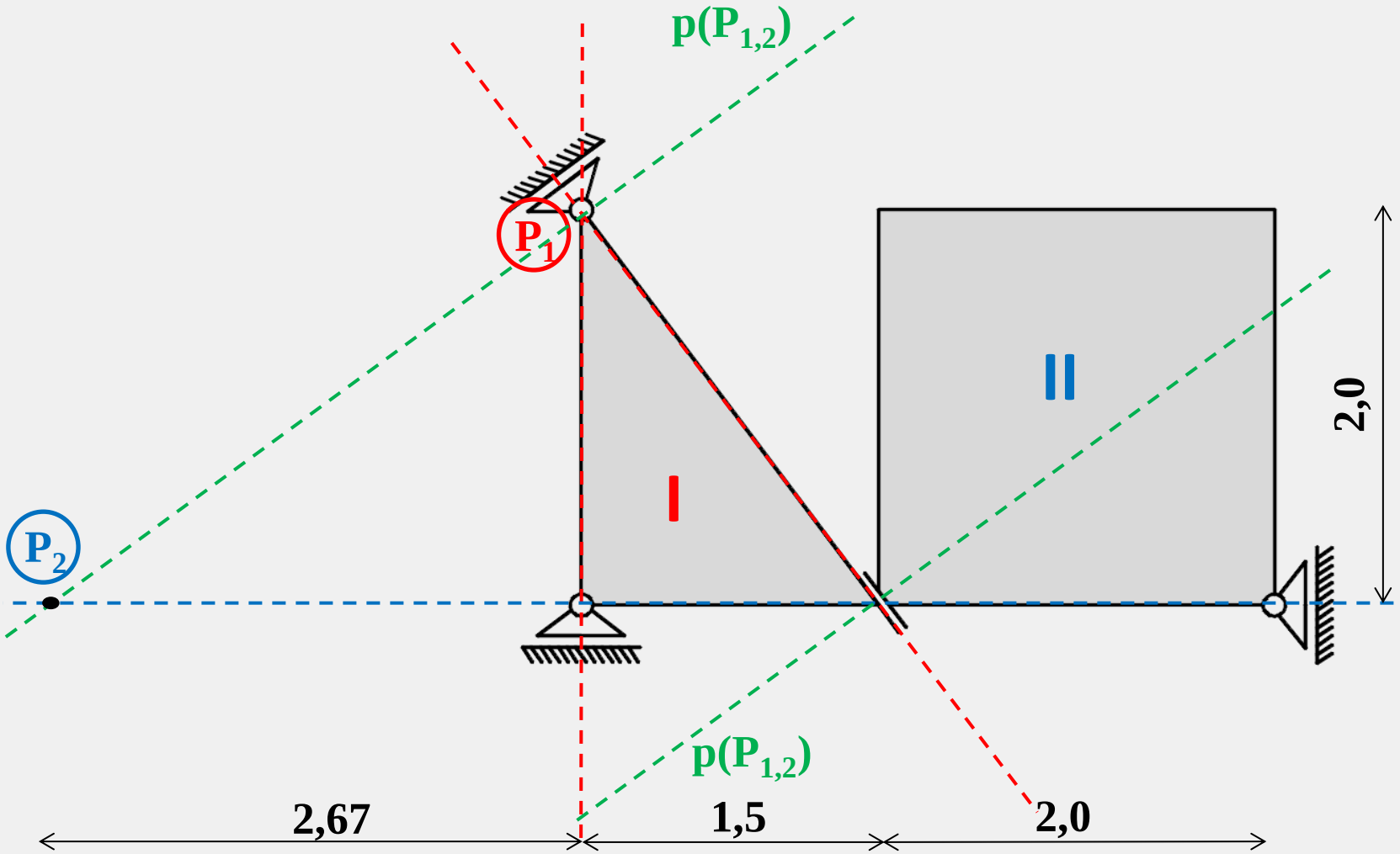

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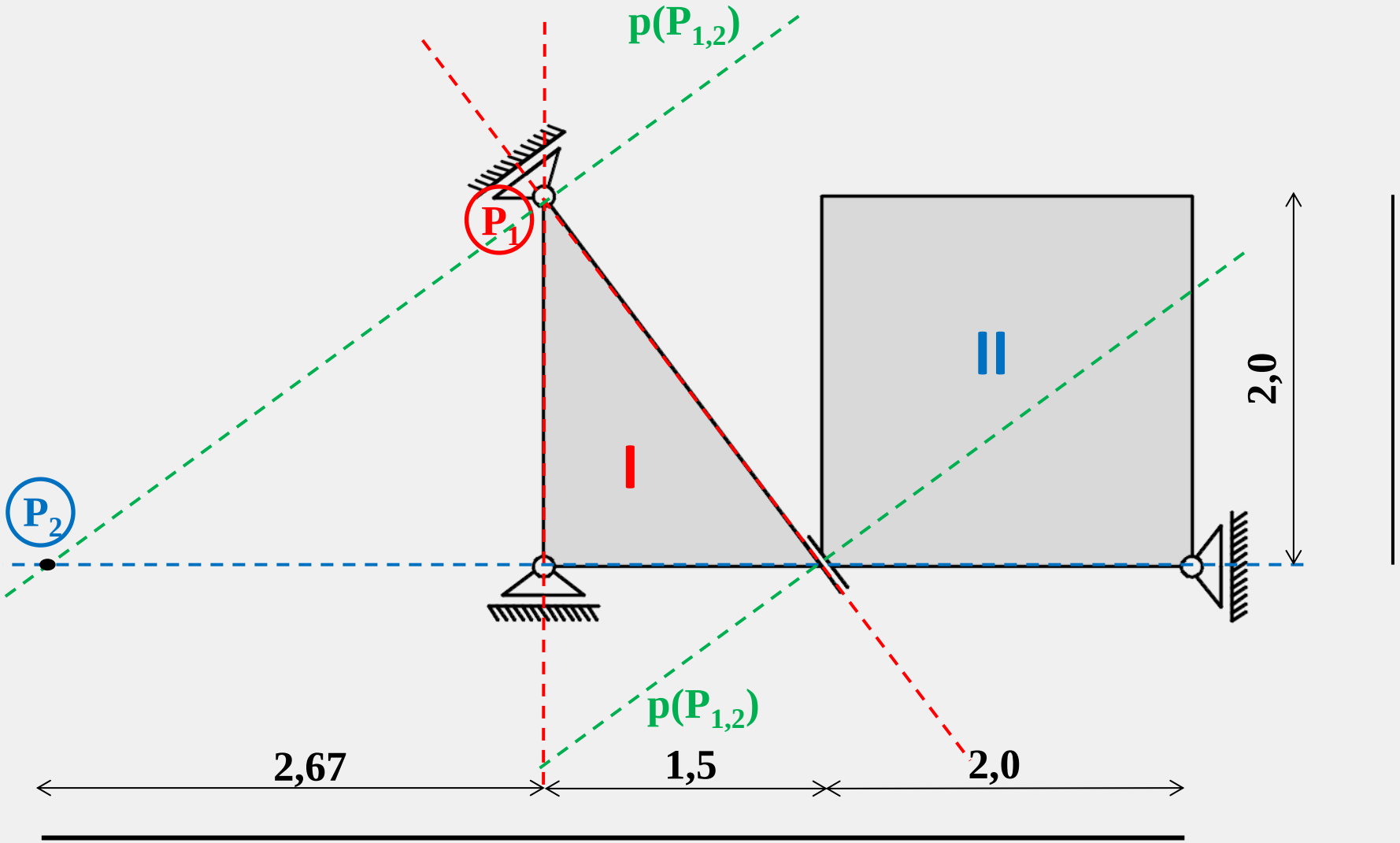

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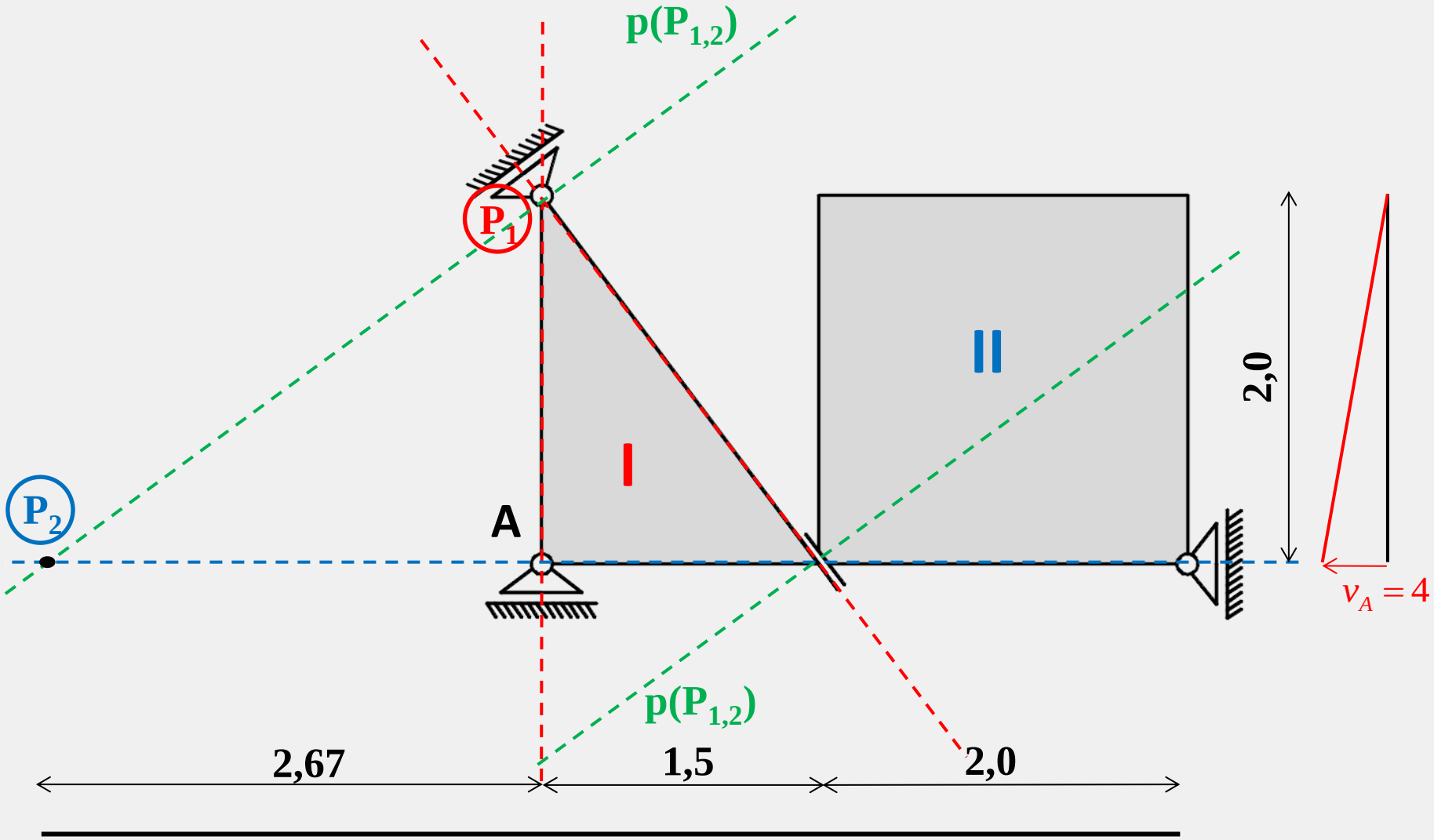

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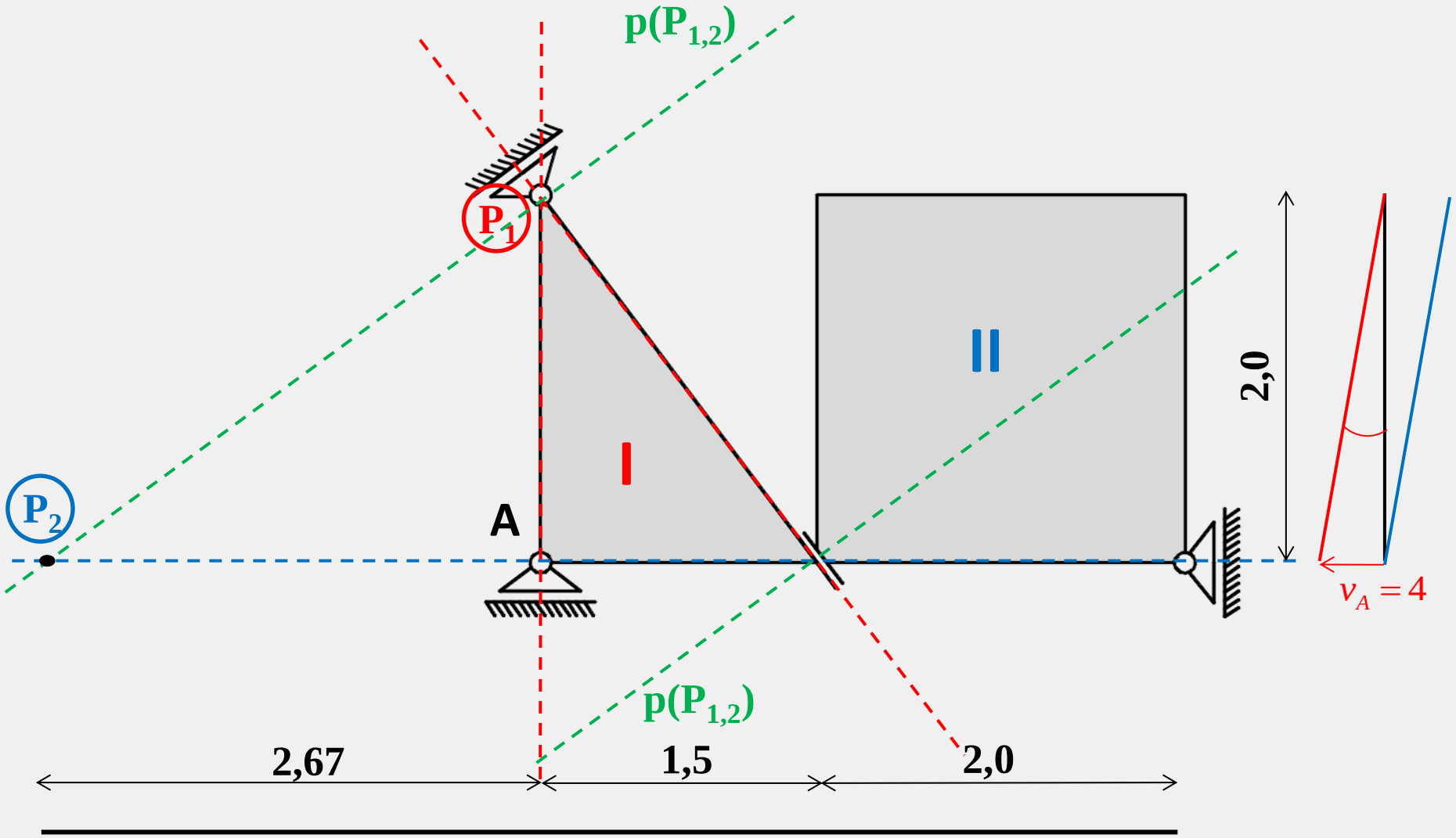

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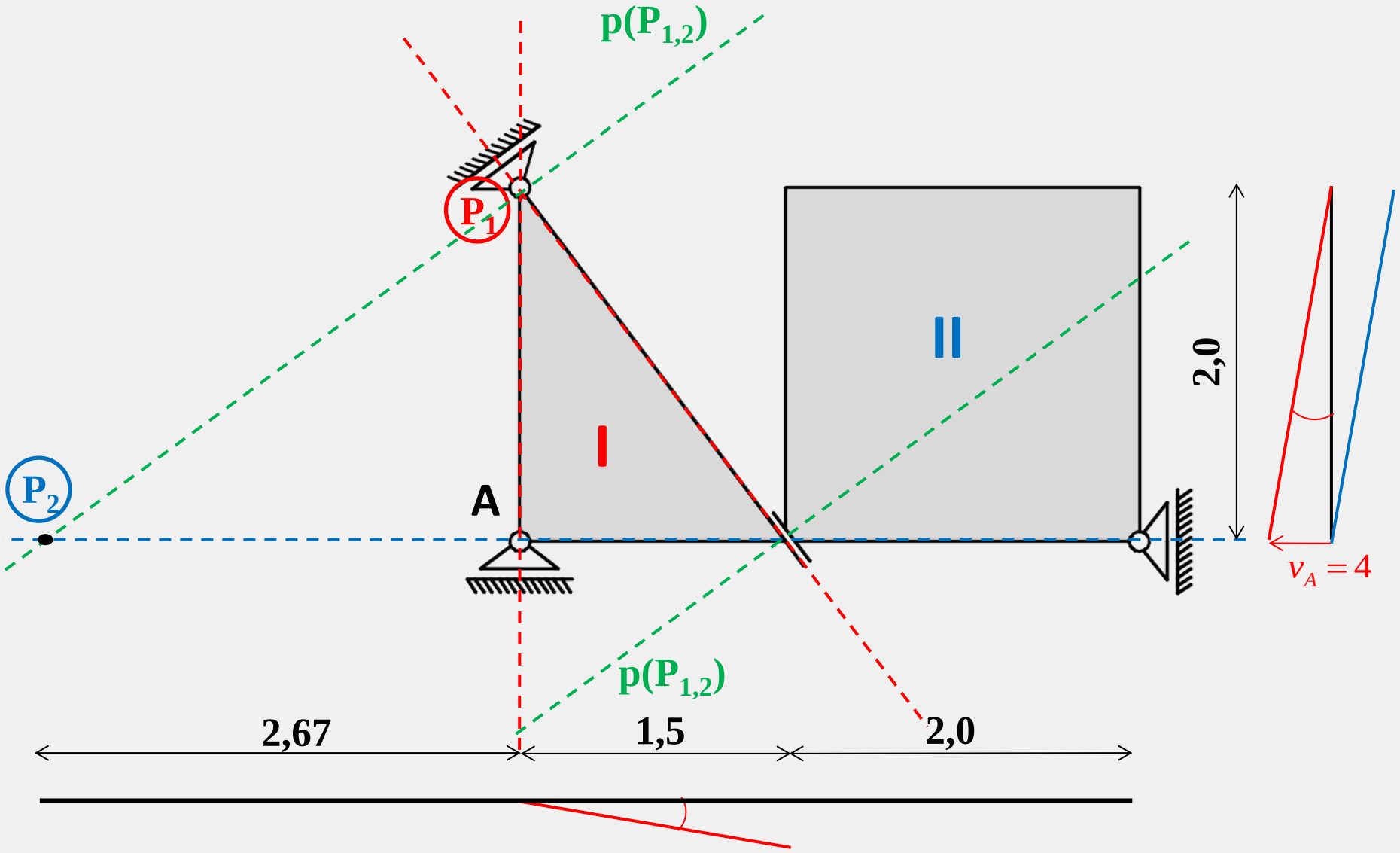

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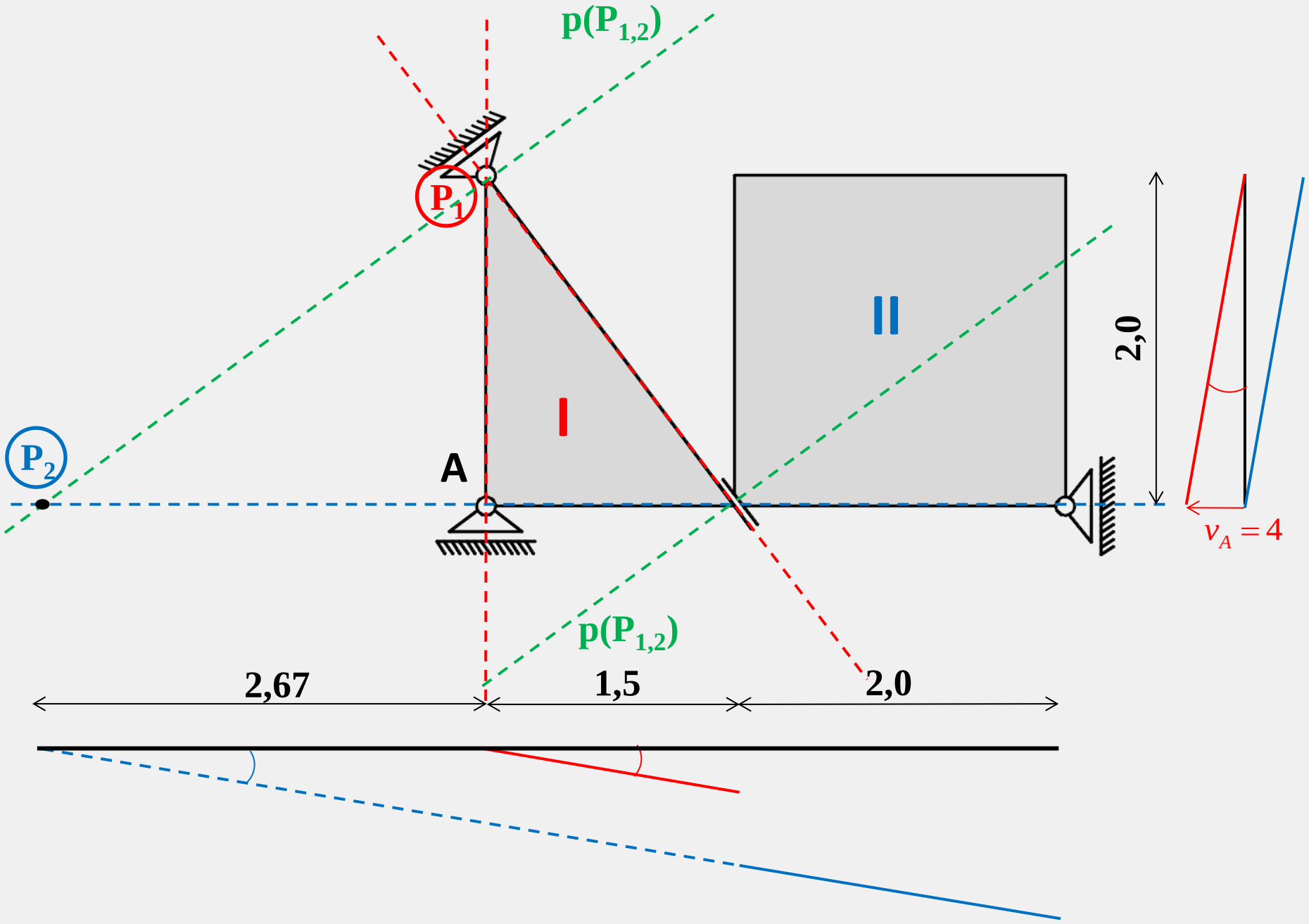
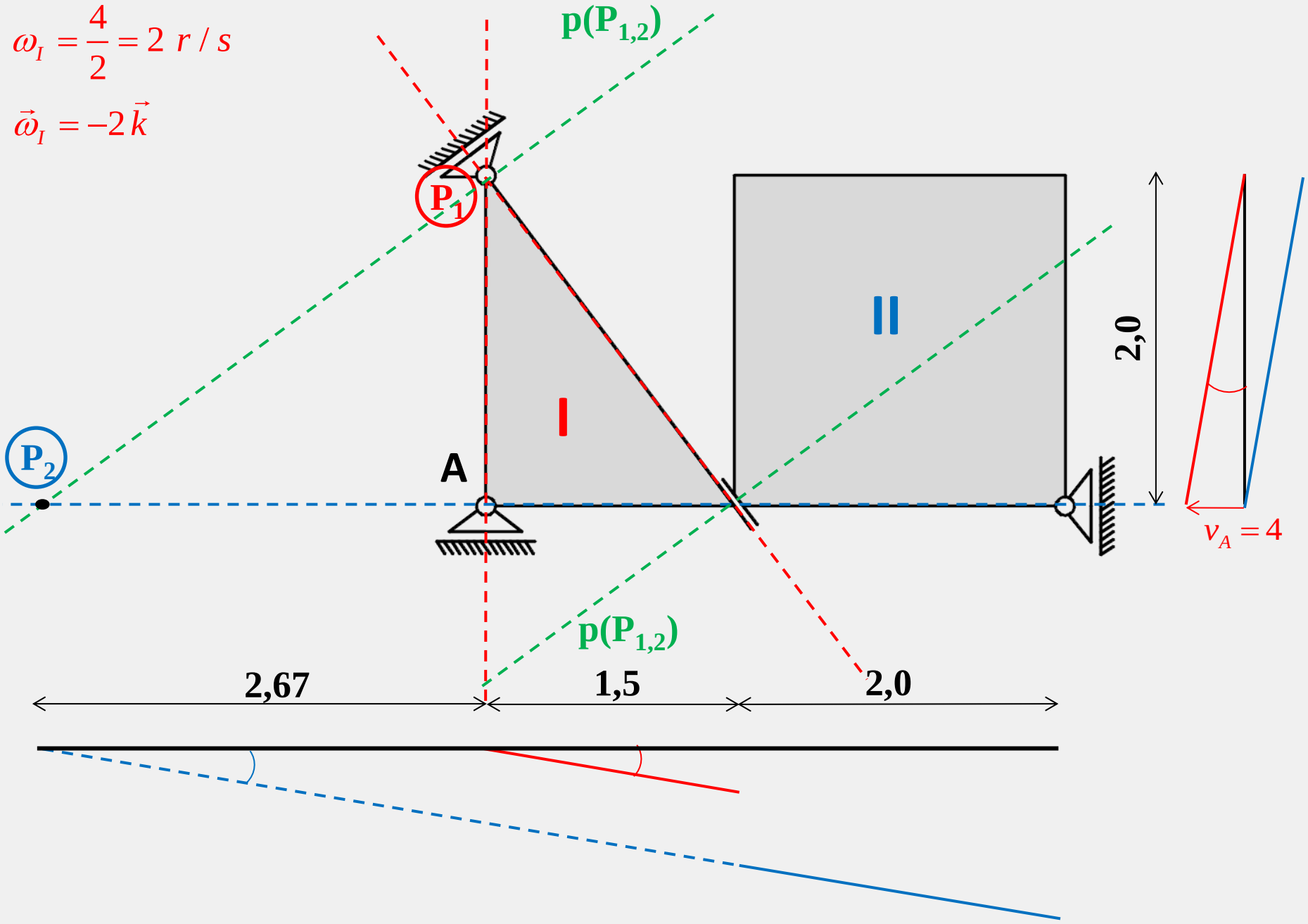


ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA

$$\omega_I = \frac{4}{2} = 2\ r/s$$

$$\vec{\omega}_I = -2\vec{k}$$



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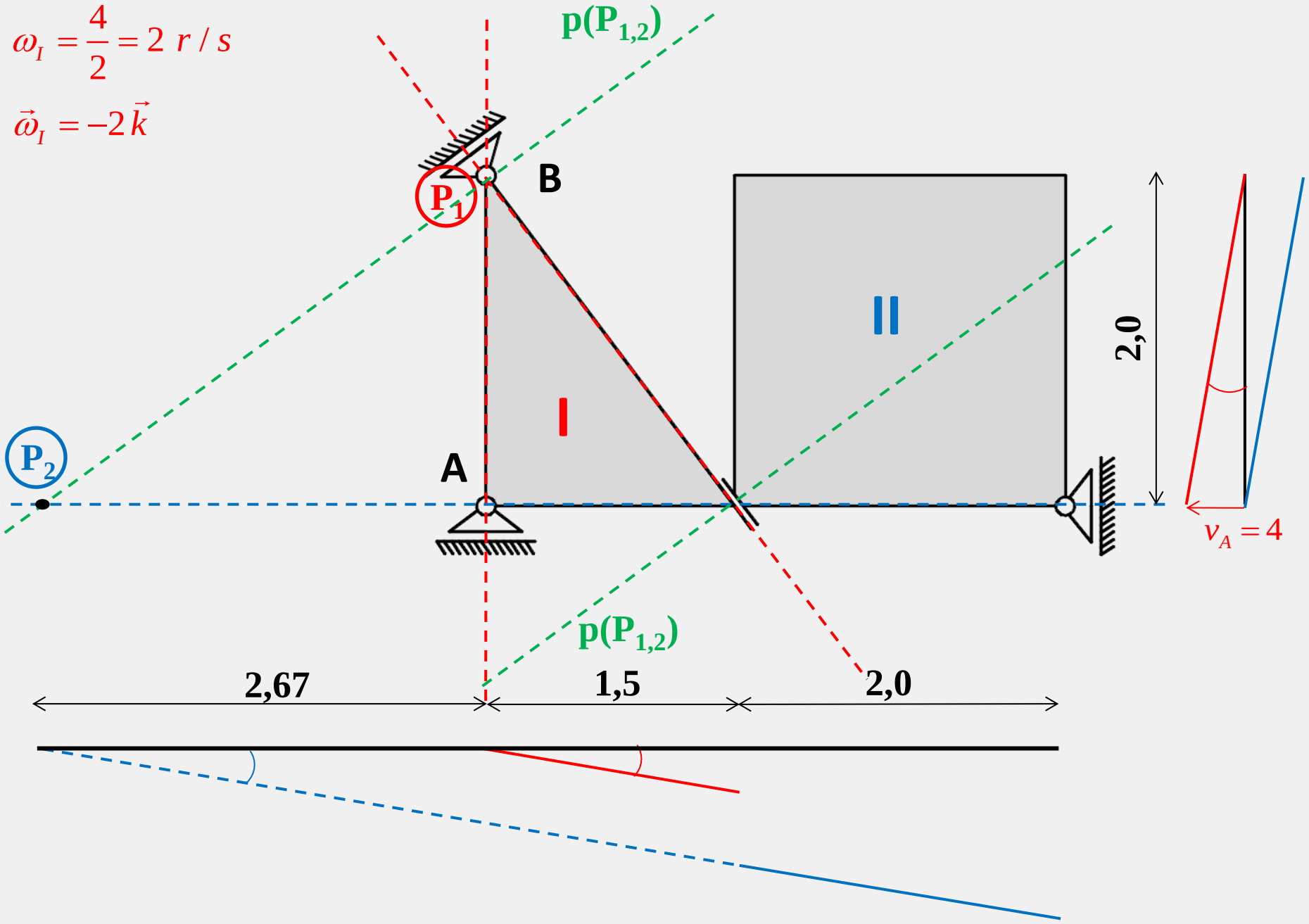
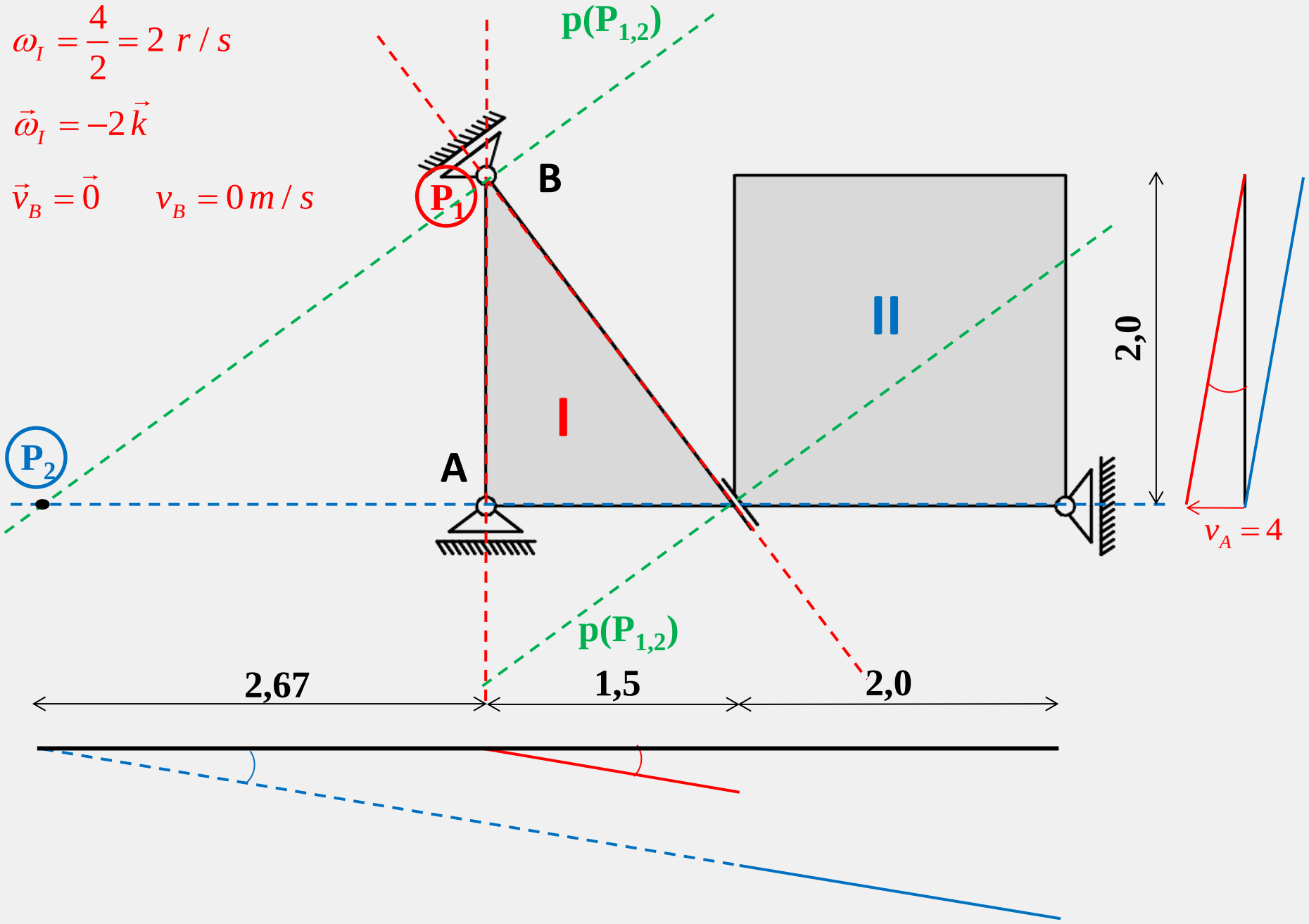


ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA

$\omega_I = \frac{4}{2} = 2\ r/s$

$\vec{\omega}_I = -2\vec{k}$

$\vec{v}_B = \vec{0}$ $\quad v_B = 0\,m/s$



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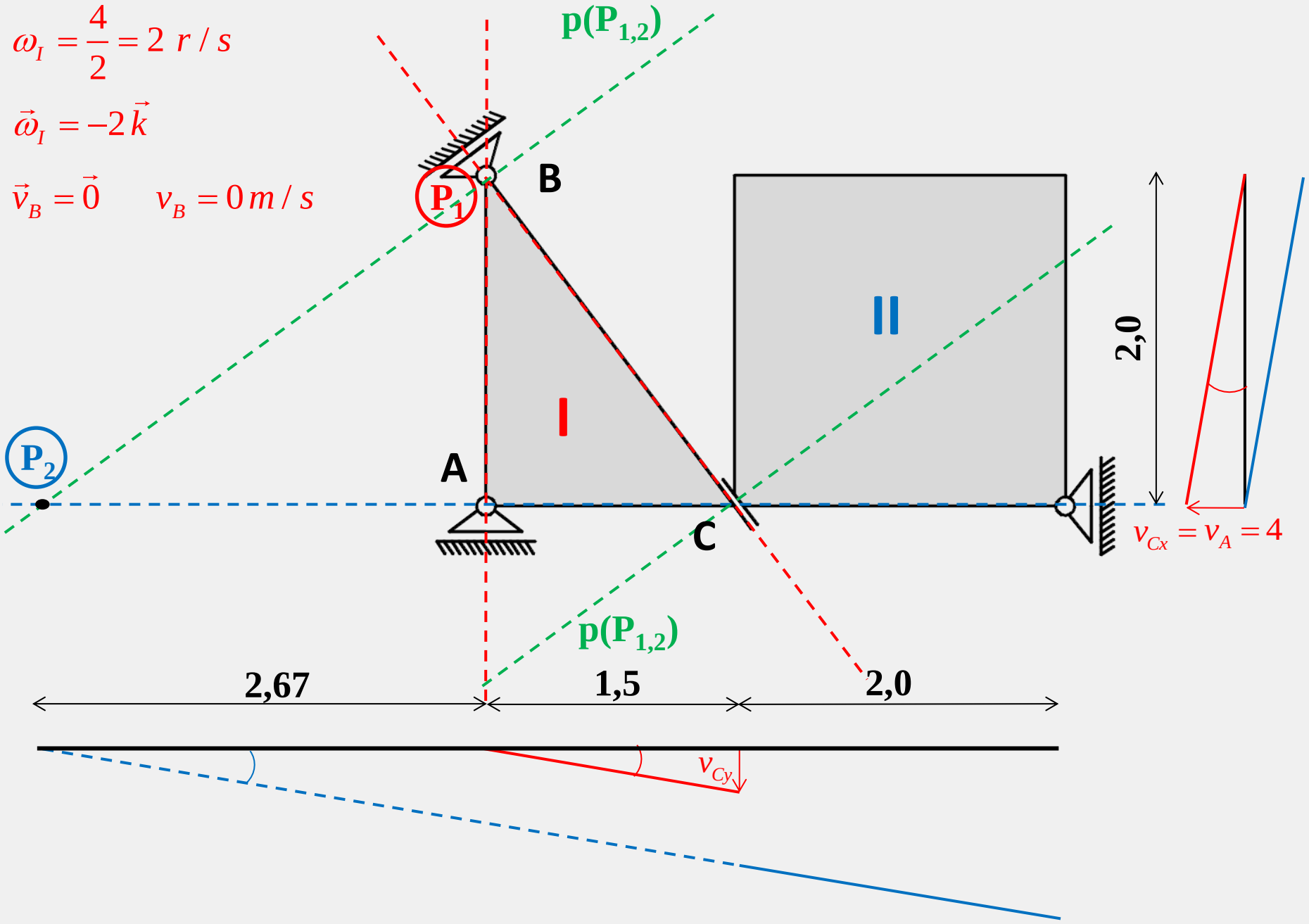

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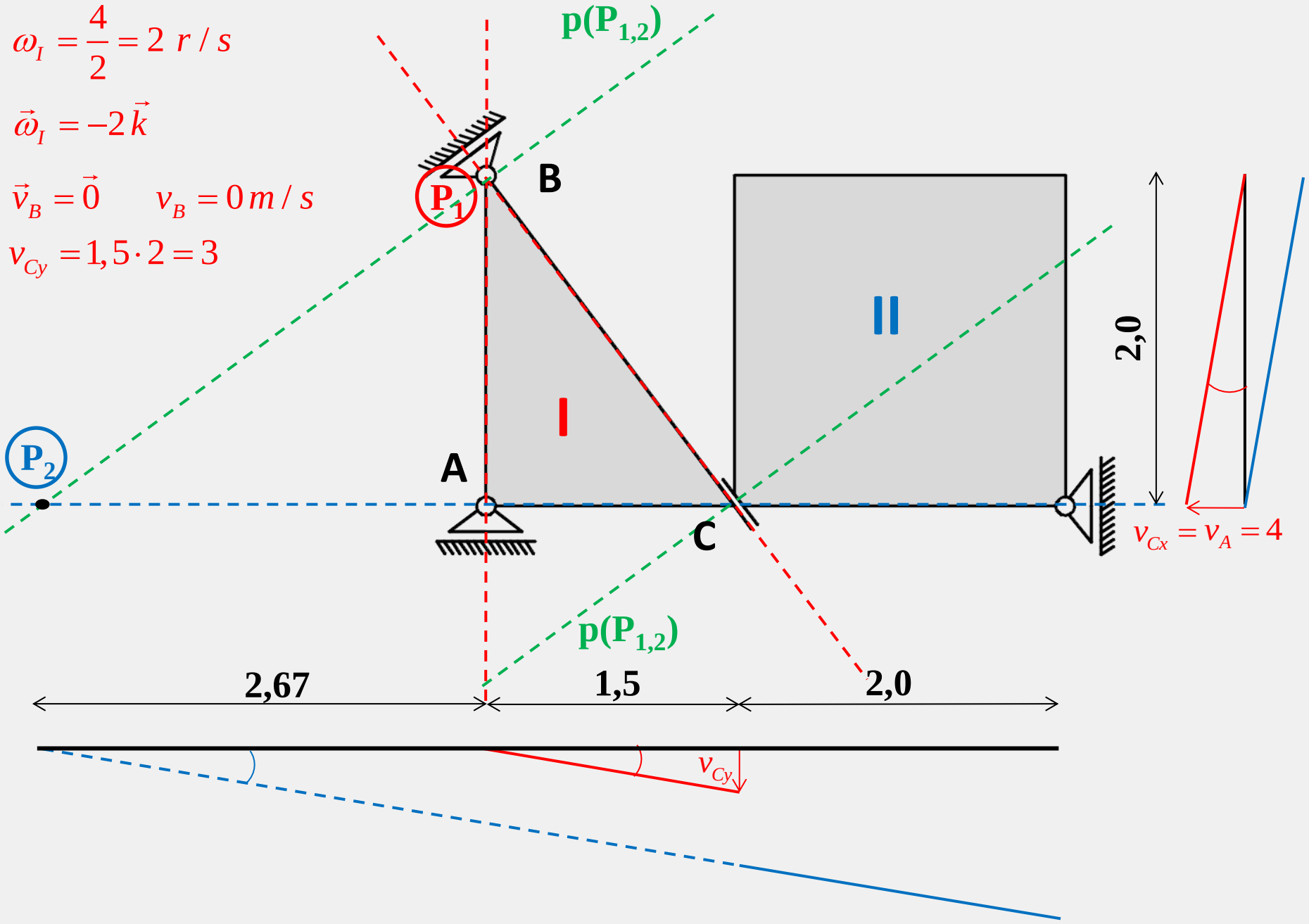
$\vec{v}_B = \vec{0} \qquad v_B = 0\,m/s$

$v_{Cy} = 1{,}5 \cdot 2 = 3$



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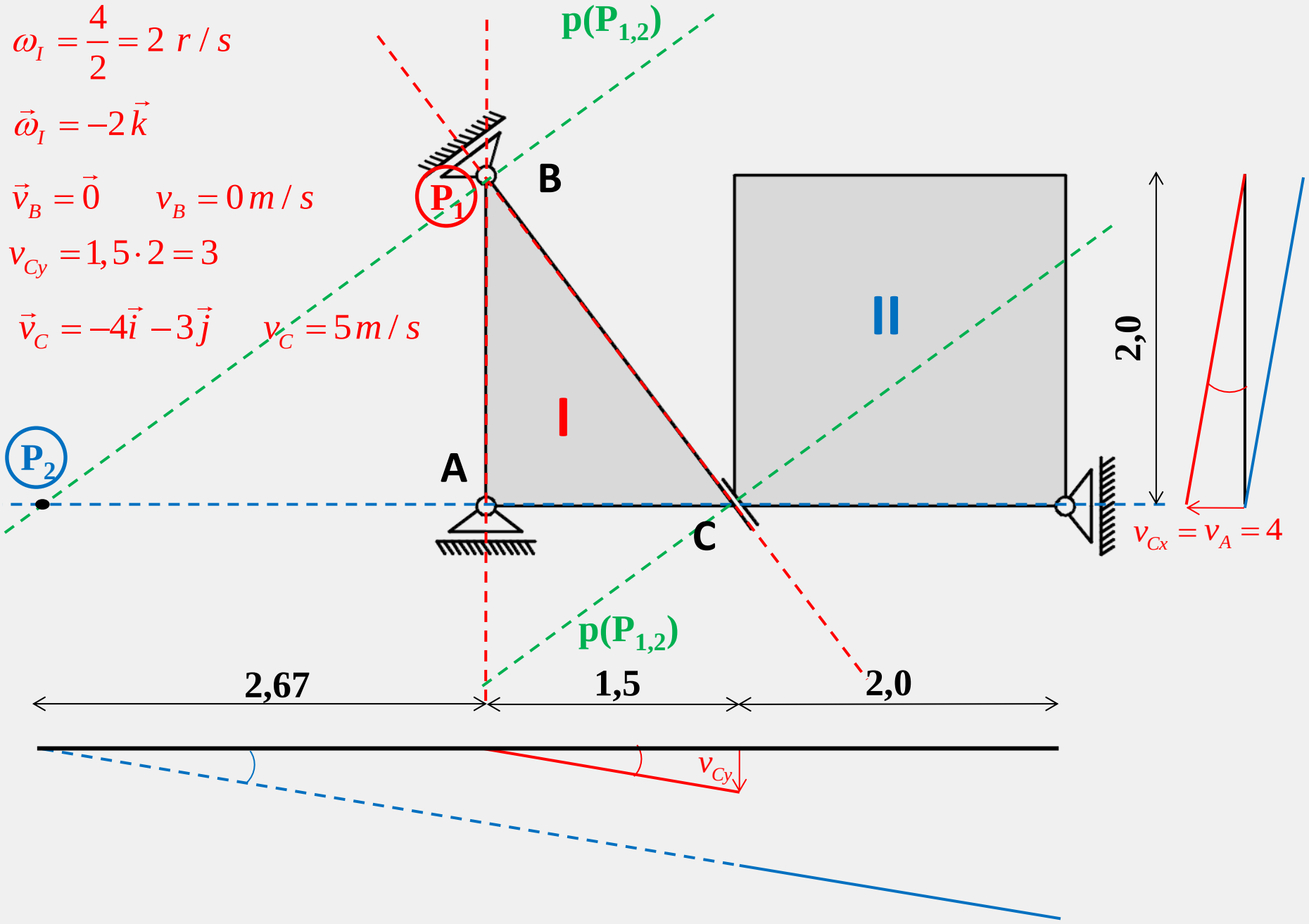
$\vec{v}_C = -4\vec{i} - 3\vec{j} \qquad v_C = 5\,m/s$



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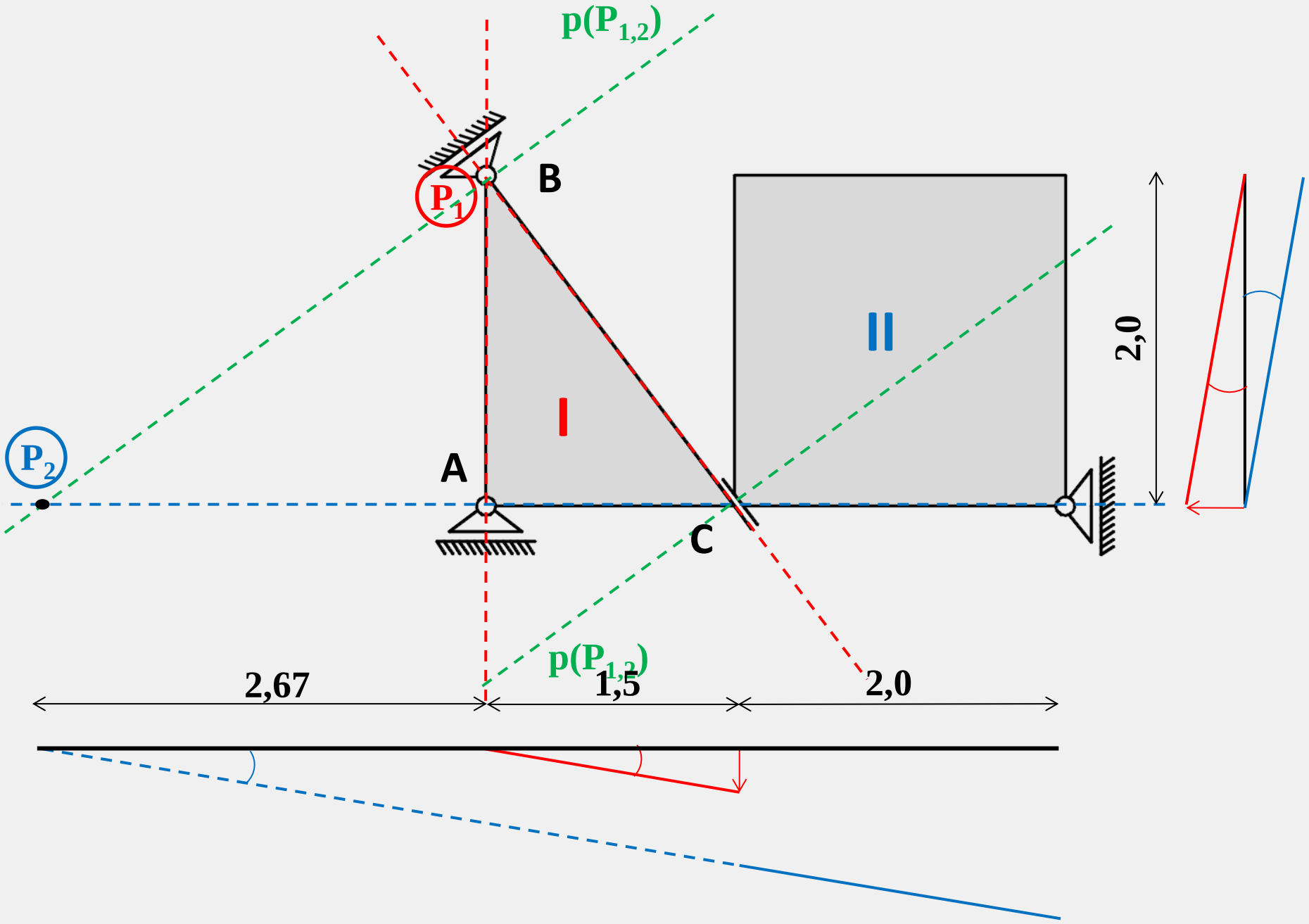

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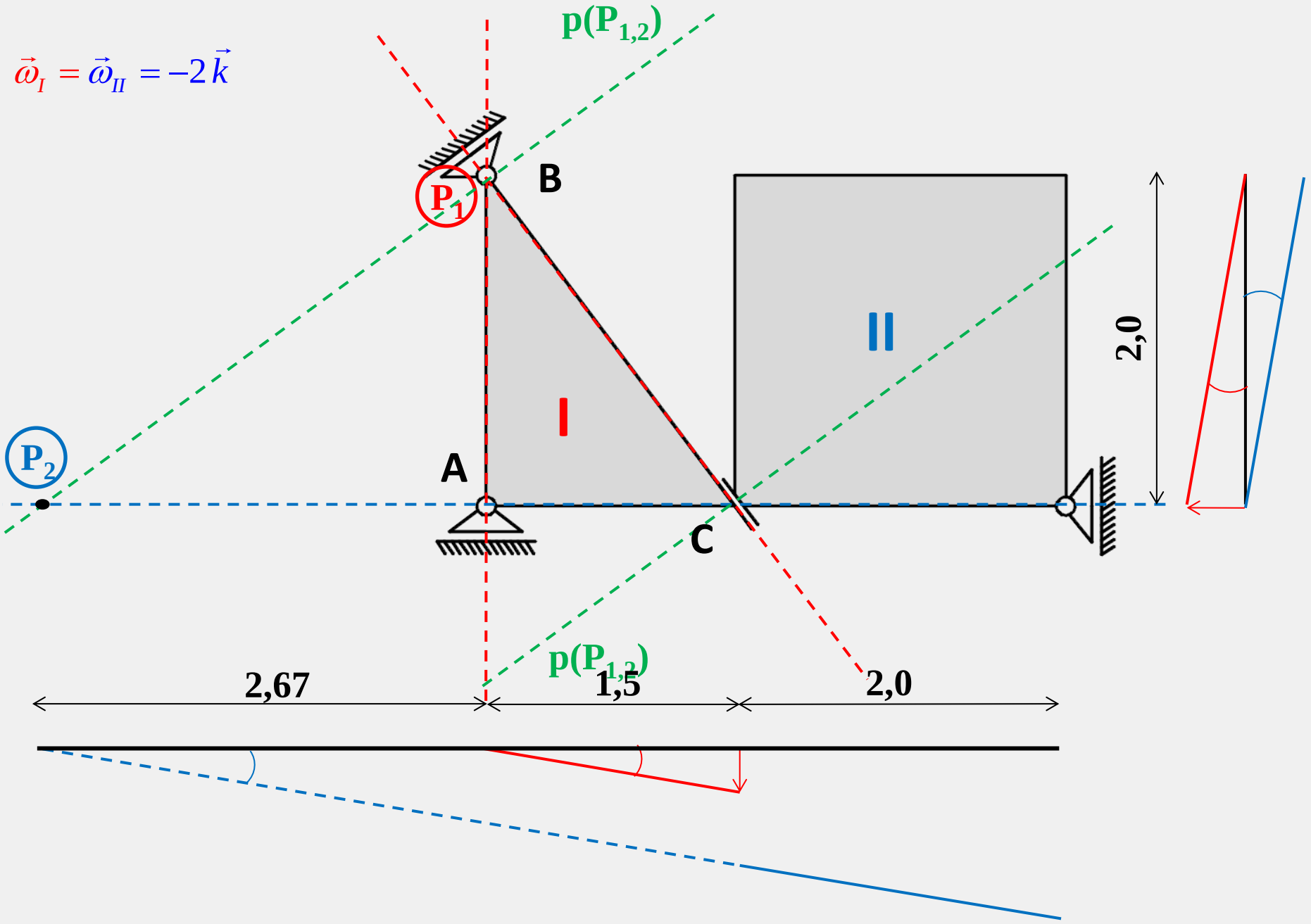

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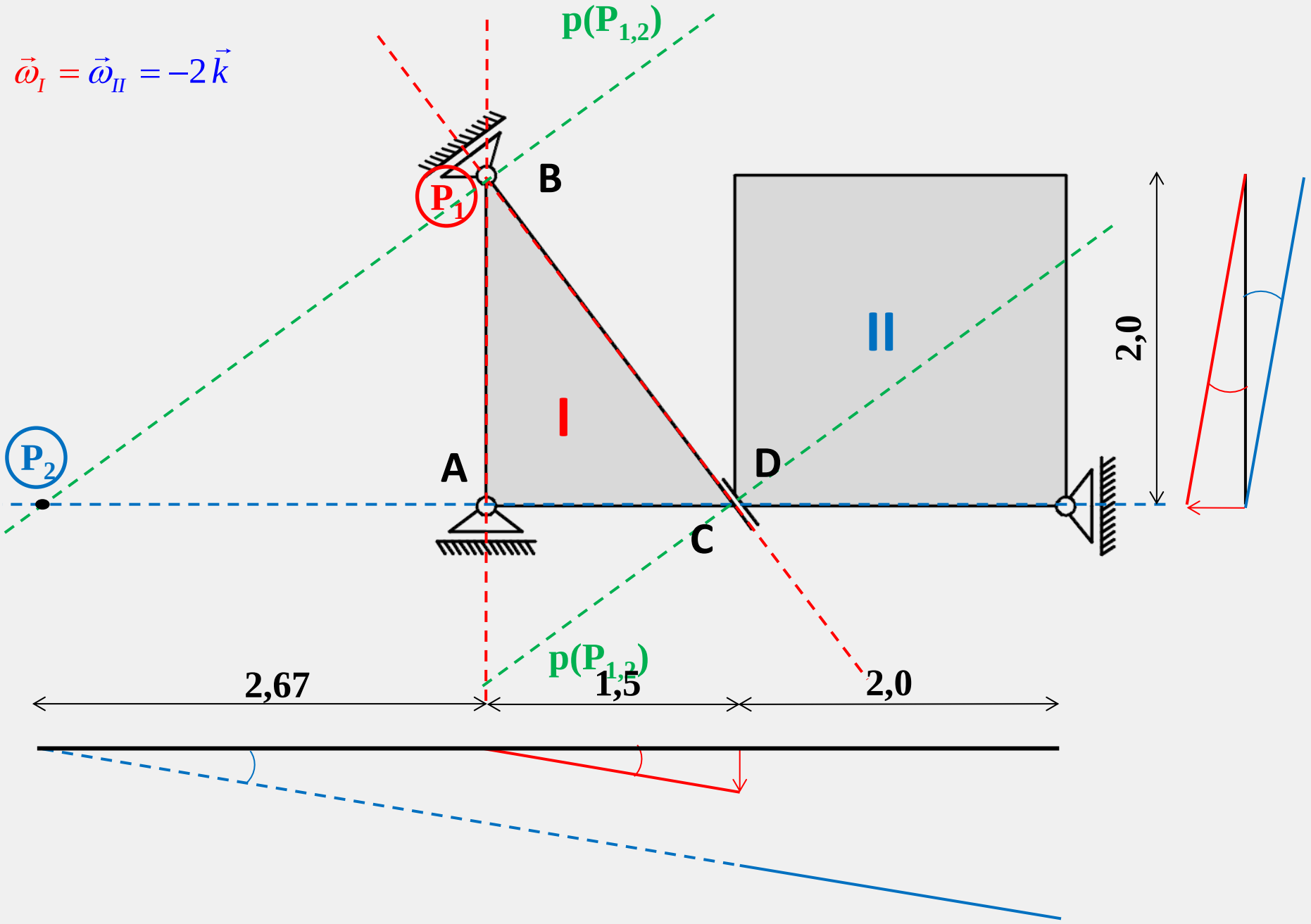

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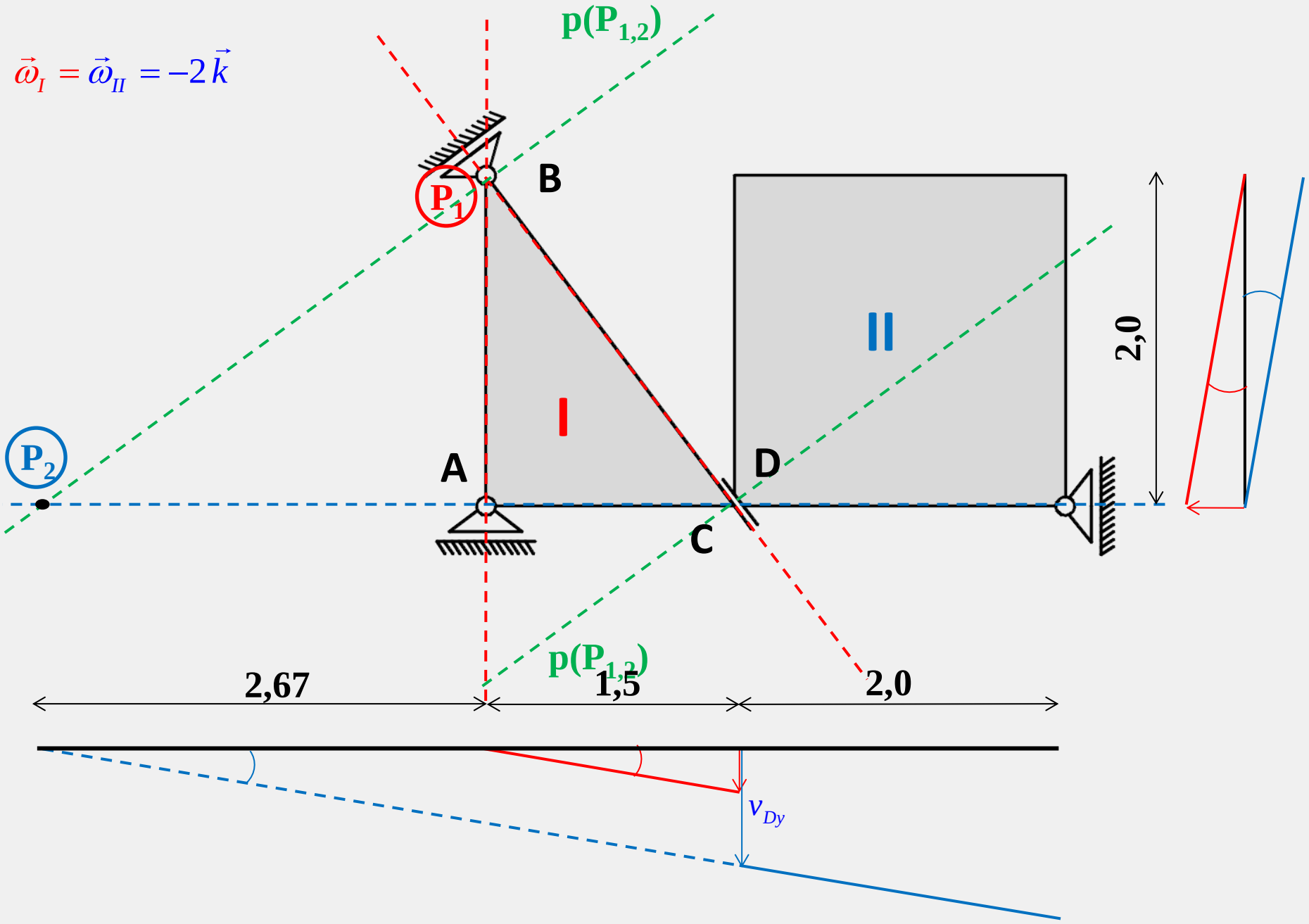
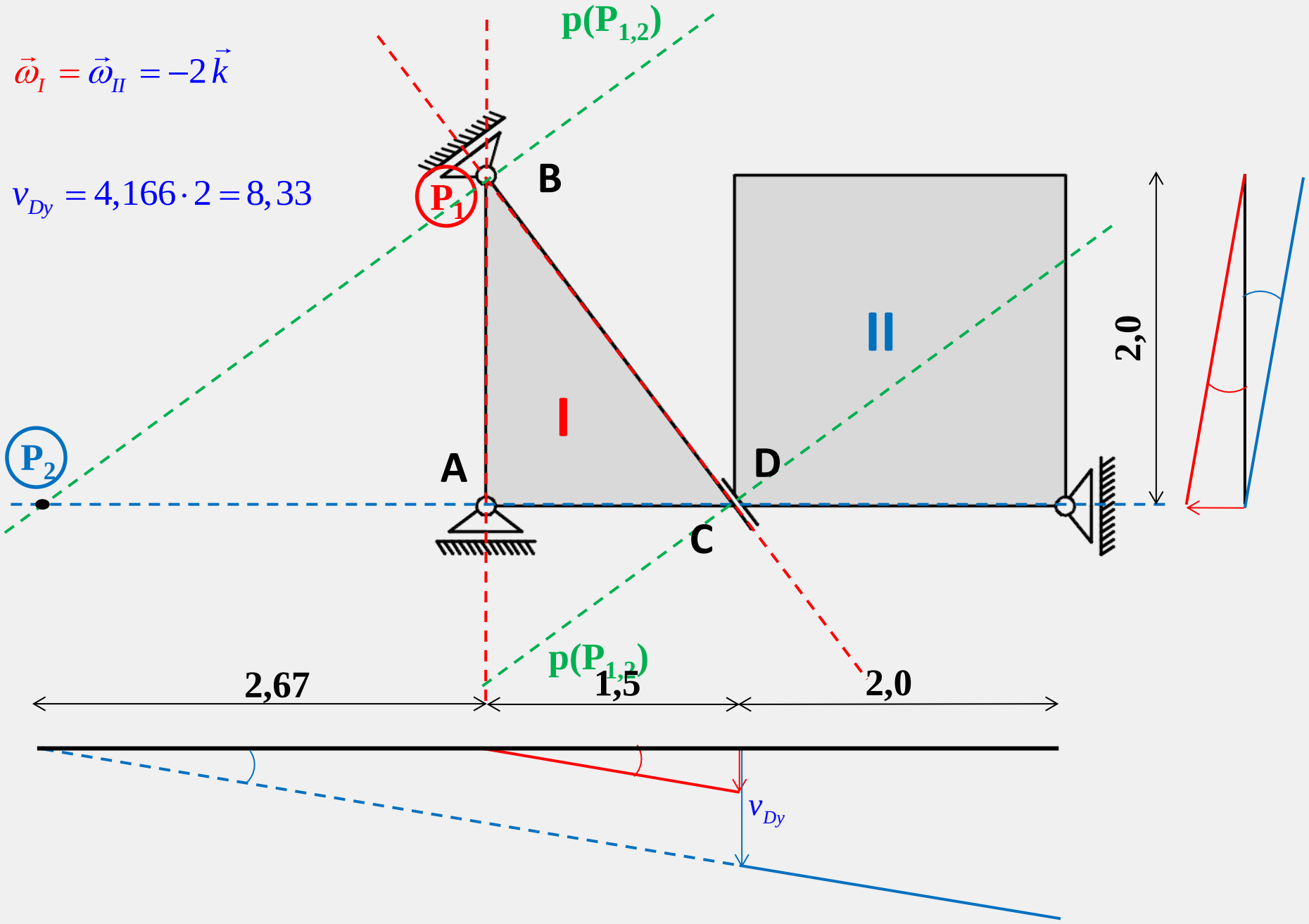


ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA

$\vec{\omega}_I = \vec{\omega}_{II} = -2\,\vec{k}$

$v_{Dy} = 4{,}166 \cdot 2 = 8{,}33$



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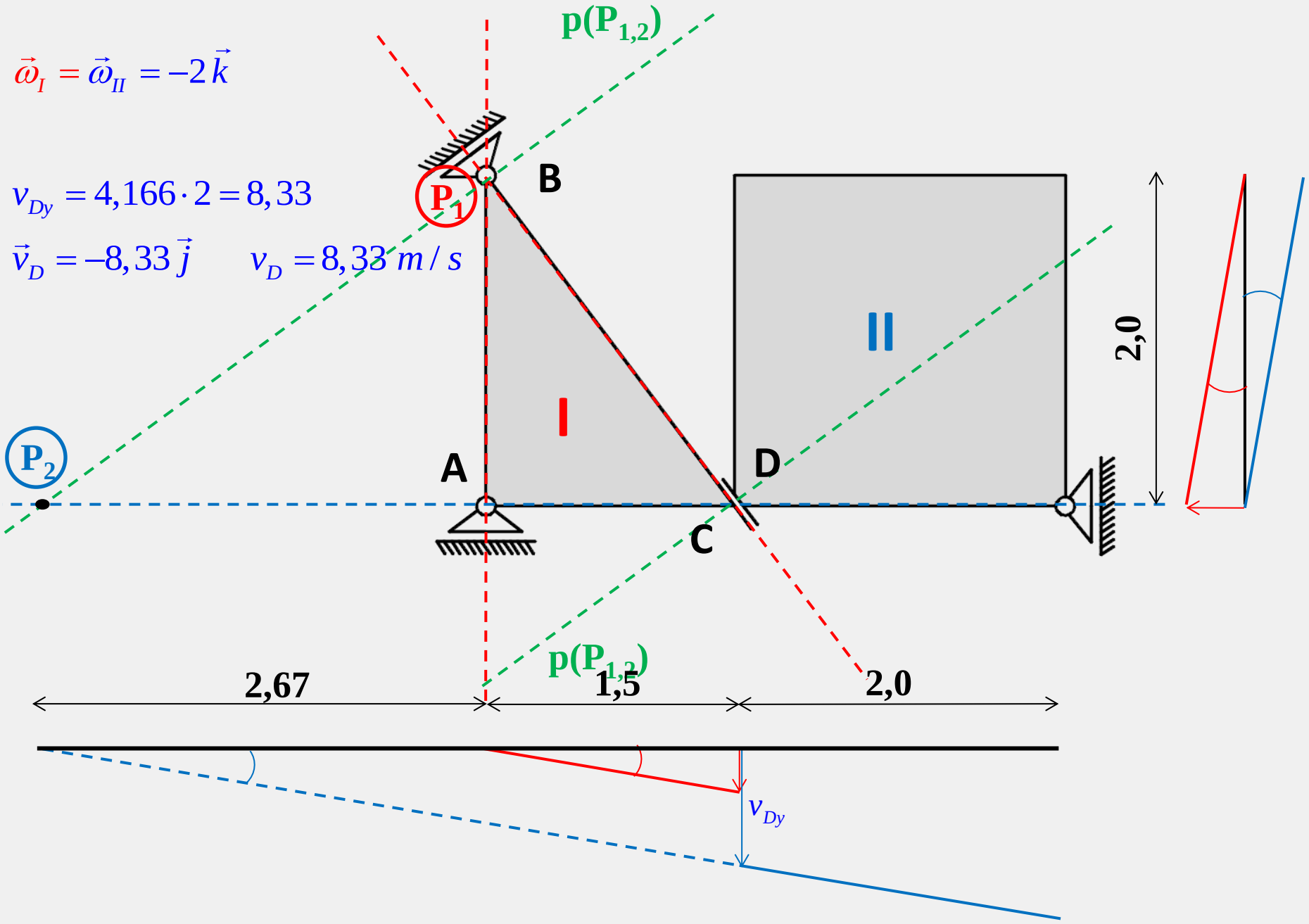
$\vec{\omega}_I = \vec{\omega}_{II} = -2\,\vec{k}$

$v_{Dy} = 4{,}166 \cdot 2 = 8{,}33$

$\vec{v}_D = -8{,}33\,\vec{j}$ $\quad v_D = 8{,}33\ m/s$

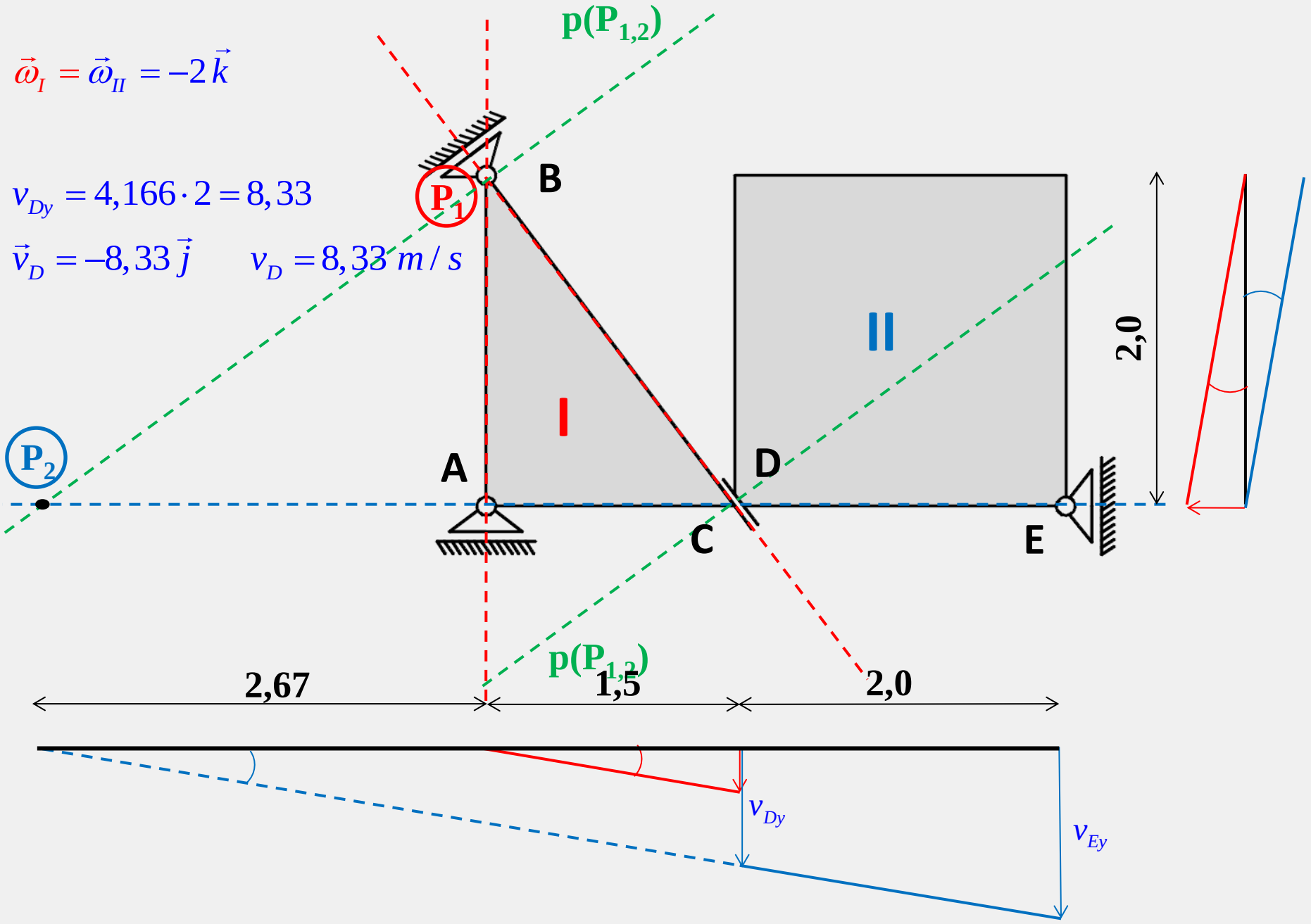


ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA

$\vec{\omega}_I = \vec{\omega}_{II} = -2\,\vec{k}$

$v_{Dy} = 4{,}166 \cdot 2 = 8{,}33$

$\vec{v}_D = -8{,}33\,\vec{j}$ $\quad v_D = 8{,}33\ m/s$



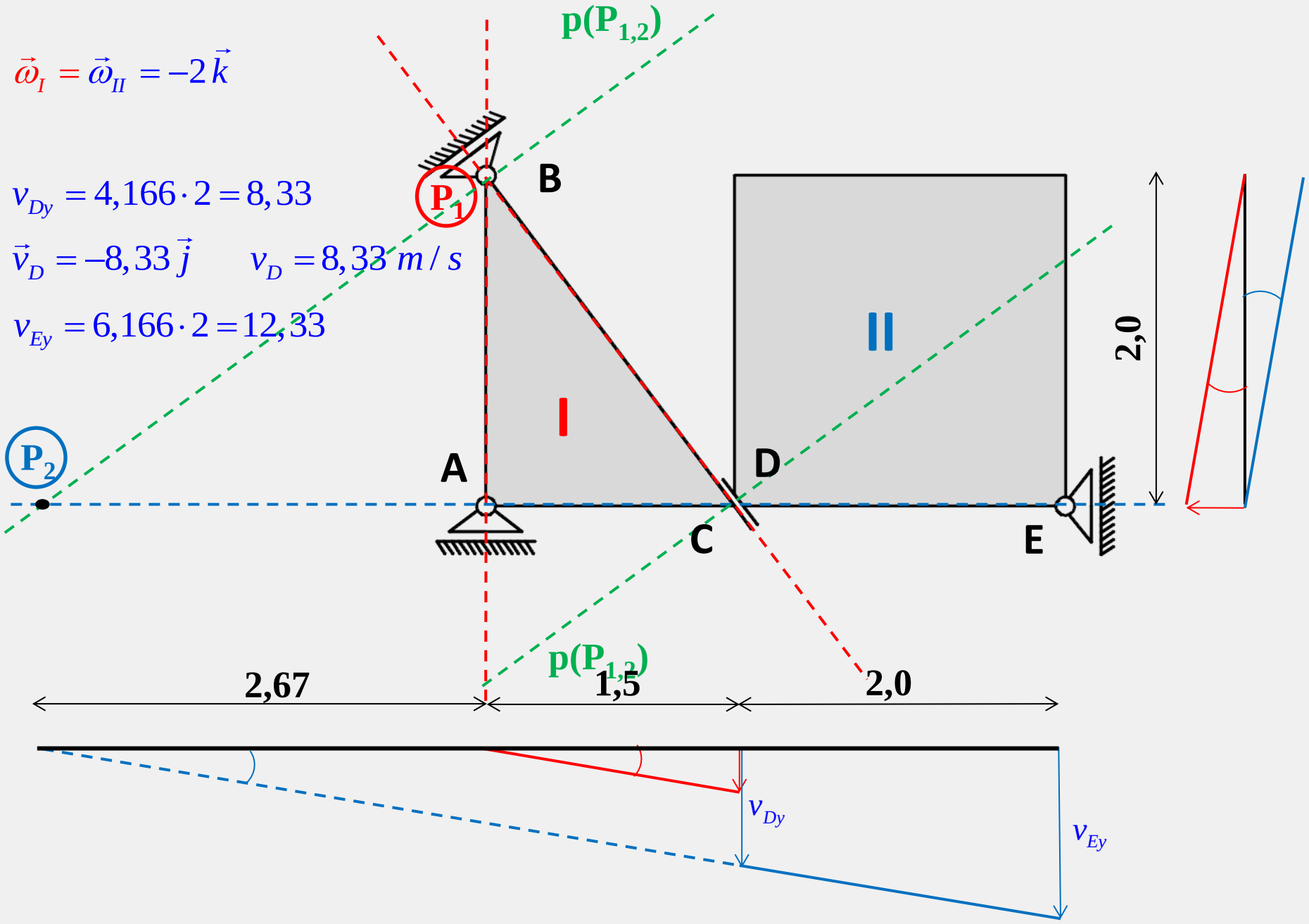
ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA

$\vec{\omega}_I = \vec{\omega}_{II} = -2\,\vec{k}$

$v_{Dy} = 4{,}166 \cdot 2 = 8{,}33$

$\vec{v}_D = -8{,}33\,\vec{j} \qquad v_D = 8{,}33\ m/s$

$v_{Ey} = 6{,}166 \cdot 2 = 12{,}33$



ODREĐIVANJE VEKTORA BRZINA TOČAKA PRIMJENOM PLANA PROJEKCIJA BRZINA

$\vec{\omega}_I = \vec{\omega}_{II} = -2\vec{k}$

$v_{Dy} = 4{,}166 \cdot 2 = 8{,}33$

$\vec{v}_D = -8{,}33\,\vec{j}$ $\quad v_D = 8{,}33\ m/s$

$v_{Ey} = 6{,}166 \cdot 2 = 12{,}33$

$\vec{v}_E = -12{,}33\,\vec{j}$ $\quad v_E = 12{,}33\ m/s$