

Písemka z mechaniky 1_sk. 13.05

1. Jsou dány vektory $\mathbf{a} = -2\mathbf{i} + \mathbf{j} + 5\mathbf{k}$ a $\mathbf{b} = 2\mathbf{i} - 3\mathbf{j} + 8\mathbf{k}$. Určete velikost průmětu b_a vektoru \mathbf{b} do směru vektoru \mathbf{a} a jednotkový vektor \mathbf{n} ve směru vektoru \mathbf{a} .

Handwritten solution:

$$\begin{aligned} \vec{a} &= (-2, 1, 5) \\ \vec{b} &= (2, -3, 8) \end{aligned}$$

Diagram showing vector \vec{a} and its projection b_a onto vector \vec{b} .

$$\mathbf{n} = \frac{-2 \mathbf{i} + \mathbf{j} + 5 \mathbf{k}}{\sqrt{4 + 1 + 25}} = \frac{-2}{\sqrt{30}} \mathbf{i} + \frac{1}{\sqrt{30}} \mathbf{j} + \frac{5}{\sqrt{30}} \mathbf{k} = \mathbf{n}$$
$$b_a = \frac{-2}{\sqrt{30}} \cdot 2 + \frac{1}{\sqrt{30}} \cdot (-3) + \frac{5}{\sqrt{30}} \cdot 8 = \frac{-4}{\sqrt{30}} + \frac{-3}{\sqrt{30}} + \frac{40}{\sqrt{30}} = \frac{33}{\sqrt{30}}$$