

在空间直角坐标系中, 向量  $a = (1, 0, 1)$ ,  $b = (1, -2, 0)$ ,  $c = (-1, 2, 1)$ .

计算  $\text{Prj}_c(a + b)$ .

**[解析]** 根据投影的定义, 有

$$\text{Prj}_c(a + b) = \|a + b\| \cos \langle (a + b), c \rangle = \|a + b\| \frac{(a + b) \cdot c}{\|a + b\| \|c\|} = \frac{(a + b) \cdot c}{\|c\|}.$$

又因为  $a + b = (1 + 1, 0 + (-2), 1 + 0) = (2, -2, 1)$

$$(a + b) \cdot c = 2 \times (-1) + (-2) \times 2 + 1 \times 1 = -5$$

$$\|c\| = \sqrt{(-1)^2 + 2^2 + 1^2} = \sqrt{6}$$

所以,  $\text{Prj}_c(a + b) = -\frac{5\sqrt{6}}{6}.$