$d := 50 \cdot 10^{-3}$ $\tau_1 := 250 \cdot 10^{-3}$ $t_1 := 2$ $t_2 := 4$ $t_3 := 6$ $t_4 := 8$ $t_5 := 10$

$A_{sez} := \frac{\pi \cdot d^2}{4}$ $\tau_2 := 800 \cdot 10^{-3}$ $i := 1$ $j := 3$

$p_{max} := 200000$

$F_{max} := p_{max} \cdot A_{sez}$

Pressione e forza in funzione del tempo

$$p_A(t) := \left[p_{max} \cdot \left(1 - e^{\frac{-t}{\tau_1}} \right) \right]$$

$P_{high} := p_A(t_1)$

$$p_B(t) := \left(P_{high} \cdot e^{\frac{-t}{\tau_2}} \right)$$

$P_{low} := p_B(t_3 - t_2)$

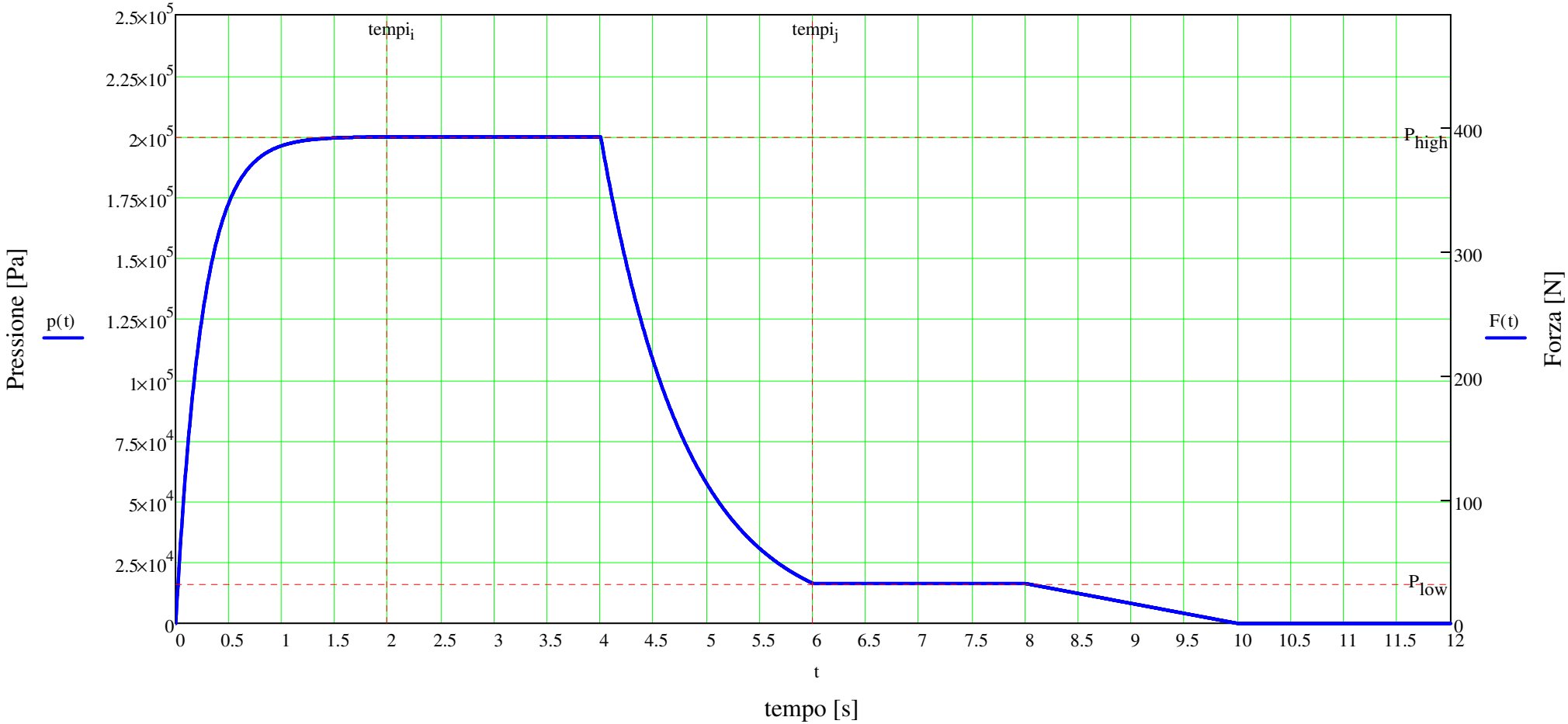
$$p(t) := \begin{cases} p_A(t) & \text{if } 0 \le t \le t_1 \\ P_{high} & \text{if } t_1 \le t \le t_2 \\ p_B(t - t_2) & \text{if } t_2 \le t \le t_3 \\ P_{low} & \text{if } t_3 \le t \le t_4 \\ \frac{-P_{low}}{t_5 - t_4} \cdot (t - t_5) & \text{if } t_4 \le t \le t_5 \\ 0 & \text{otherwise} \end{cases}$$

$F(t) := A_{sez} \cdot p(t)$

$$tempi := \begin{pmatrix} t_1 \\ t_2 \\ t_3 \\ t_4 \\ t_5 \end{pmatrix}$$

Pressione e forza in funzione del tempo

$T_{max} := 12$ $t := 0, 0.005 .. T_{max}$



Integrazione per via numerica

ORIGIN = 1

$M_{eq} := 30$ $K_{eq} := 5000$ $C_{eq} := 100$

$\omega := \sqrt{\frac{K_{eq}}{M_{eq}}} = 12.91$ $f := \frac{\omega}{2 \cdot \pi} = 2.055$ $T := \frac{1}{f} = 0.487$

$\xi := \frac{C_{eq}}{2 \cdot M_{eq} \cdot \omega} = 12.91 \cdot \%$

$\Delta t_{cons} := \frac{1}{20} \cdot T = 0.024$ $\Delta t := 0.005$

$x_0 := 0$ $v_0 := 0$

$u := \begin{pmatrix} x_0 \\ v_0 \end{pmatrix}$

$accel(x, x_p, t) := \frac{1}{M_{eq}} \cdot (F(t) - K_{eq} \cdot x - C_{eq} \cdot x_p)$

$EQMOTO(t, u) := \begin{pmatrix} u_2 \\ accel(u_1, u_2, t) \end{pmatrix}$

$N_{step} := \text{ceil}\left(\frac{T_{max}}{\Delta t}\right)$

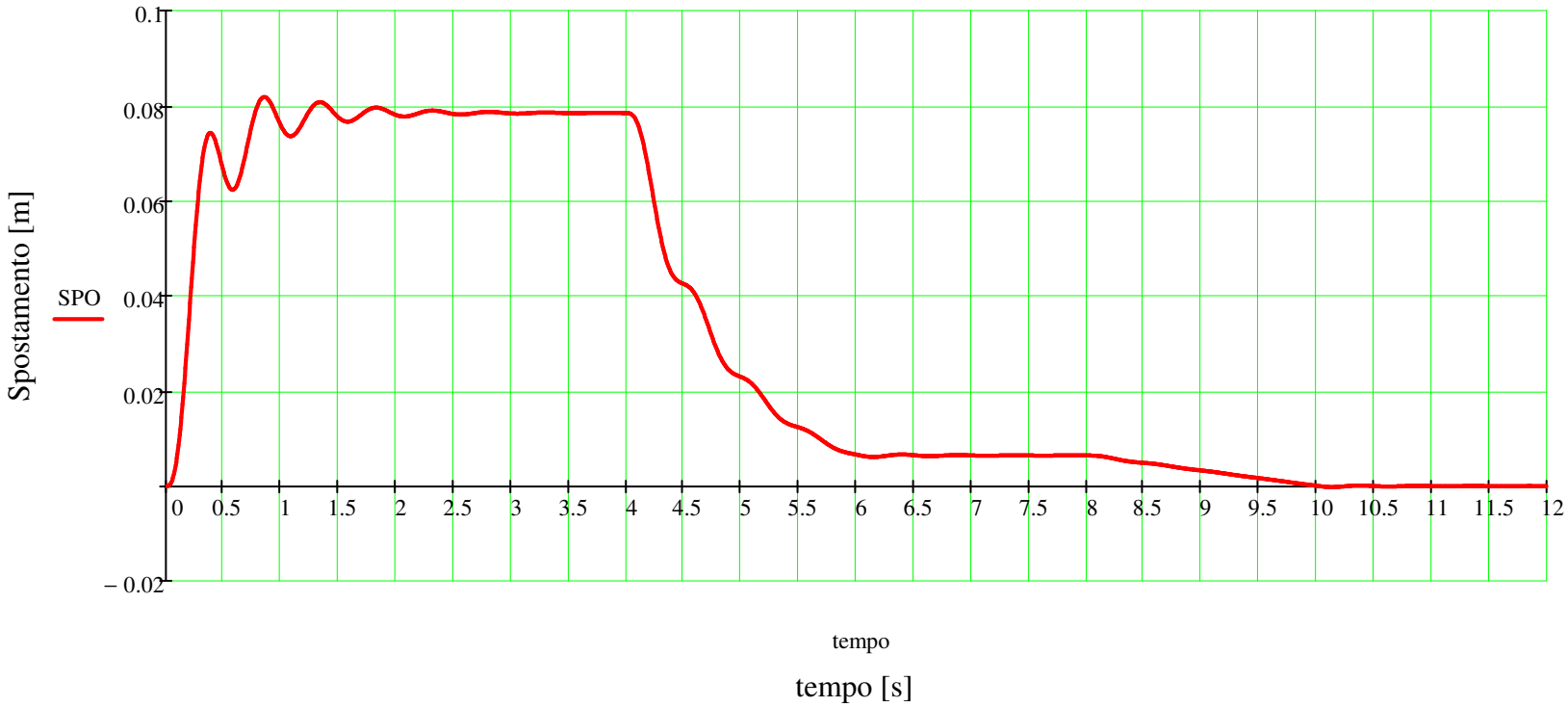
TABELLA := rkfixed(u, 0, T_{max}, N_{step}, EQMOTO)

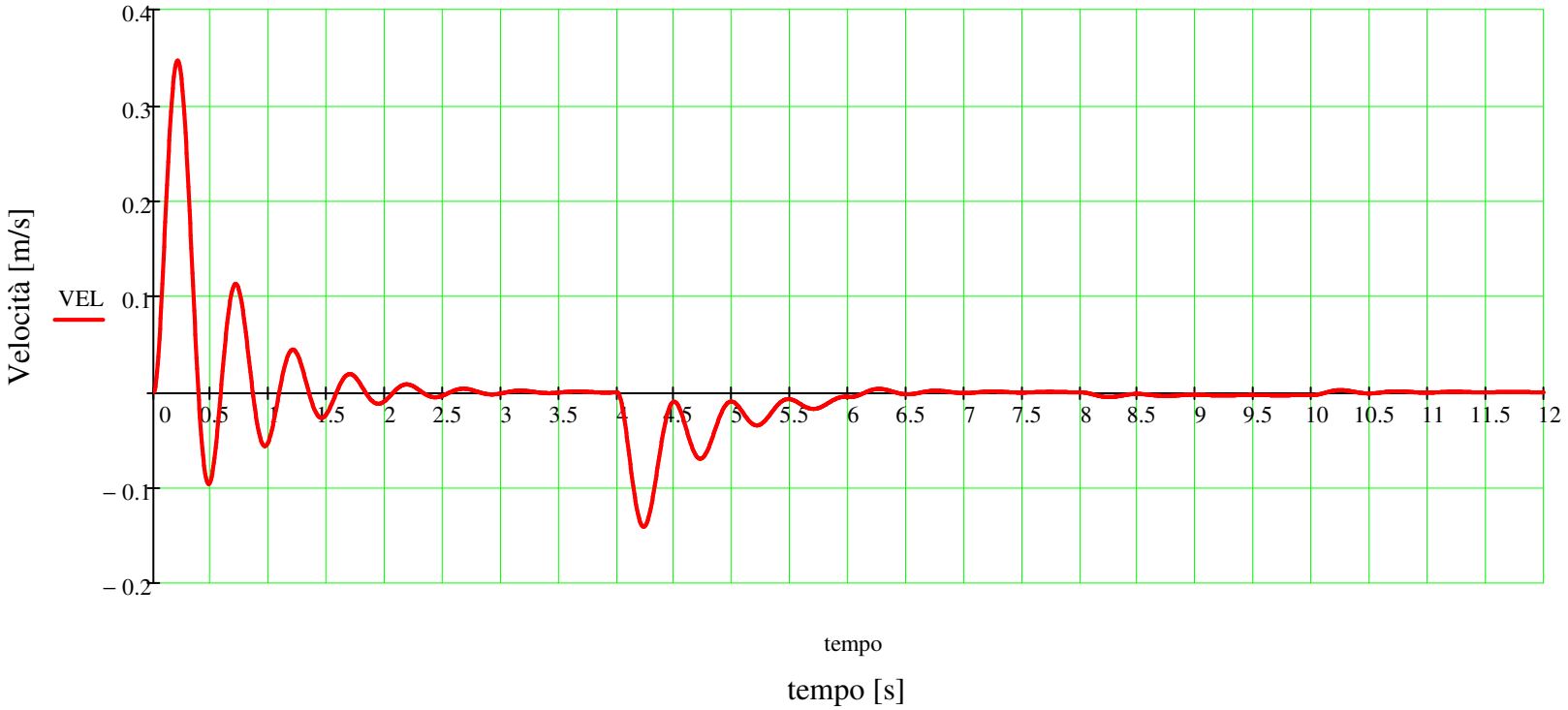
tempo := TABELLA$^{\langle 1 \rangle}$

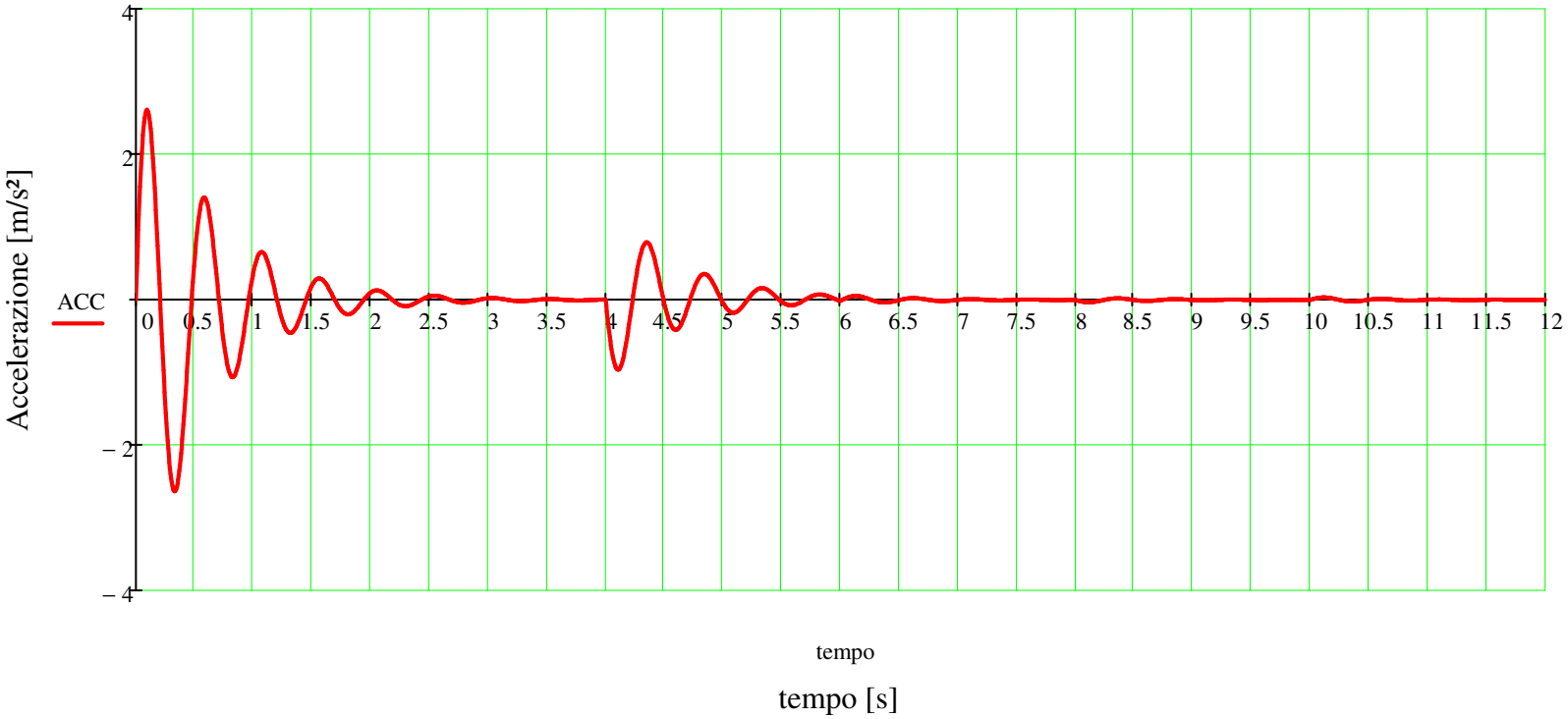
SPO := TABELLA$^{\langle 2 \rangle}$

VEL := TABELLA$^{\langle 3 \rangle}$

ACC := $\overrightarrow{\text{accel(SPO, VEL, tempo)}}$




Velocità [m/s]
VEL
0.4
0.3
0.2
0.1
– 0.1
– 0.2
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
10.5
11
11.5
12
tempo
tempo [s]


Accelerazione [m/s²]
4
2
0
– 2
– 4
ACC
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
10.5
11
11.5
12
tempo
tempo [s]