Euler-Polygonzugverfahren: Wagen der Masse m wird mit einer Antriebskraft F gegen den Luftwiderstand beschleunigt.

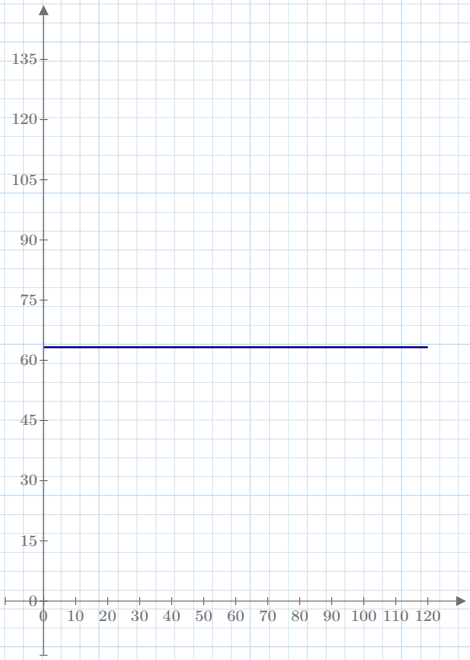
F	m_a	v_0	c_w	t_a	t_e
(N)	(kg)	$\left(\frac{m}{s}\right)$	$\left(\frac{kg}{m}\right)$	(s)	(s)
2800	1400	10	0.7	0	120

$$v(t,n) := \left\| \begin{array}{l} v \leftarrow v_0 \\ \Delta t \leftarrow \frac{t_e - t_a}{6} \\ \text{for } i \in 1..n \\ \quad \left\| \begin{array}{l} a \leftarrow \frac{F - c_w \cdot v^2}{m_a} \\ v \leftarrow v + a \cdot \Delta t \end{array} \right. \\ v \end{array} \right.$$

$$v(120\,s, 6) = 63.25\,\frac{m}{s}$$

$t := 0\,s, 1\,s..120\,s$

$v(t,6)\ \left(\frac{m}{s}\right)$



$t\ (s)$

Rekursive Berechnung von Geschwindigkeit und Beschleunigung:

$$v_0 = 10.00\,\frac{m}{s}$$

$$a_0 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_0^2 = 1.95\,\frac{m}{s^2}$$

$$v_1 := v_0 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_0^2\right) \cdot 20\,s = 49.00\,\frac{m}{s}$$

$$a_1 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_1^2 = 0.80\,\frac{m}{s^2}$$

$$v_2 := v_1 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_1^2\right) \cdot 20\,s = 64.99\,\frac{m}{s}$$

$$a_2 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_2^2 = -0.11\,\frac{m}{s^2}$$

$$v_3 := v_2 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_2^2\right) \cdot 20\,s = 62.75\,\frac{m}{s}$$

$$a_3 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_3^2 = 0.03\,\frac{m}{s^2}$$

$$v_4 := v_3 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_3^2\right) \cdot 20\,s = 63.37\,\frac{m}{s}$$

$$a_4 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_4^2 = -0.01\,\frac{m}{s^2}$$

$$v_5 := v_4 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_4^2\right) \cdot 20\,s = 63.21\,\frac{m}{s}$$

$$a_5 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_5^2 = 0.00\,\frac{m}{s^2}$$

$$v_6 := v_5 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_5^2\right) \cdot 20\,s = 63.25\,\frac{m}{s}$$

$$a_6 := \frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_6^2 = 0.00\,\frac{m}{s^2}$$

$$v_7 := v_6 + \left(\frac{F}{m_a} - \frac{c_w}{m_a} \cdot v_6^2\right) \cdot 20\,s = 63.24\,\frac{m}{s}$$