Участок 1

$v_0 := 1.2 \quad f := 0.15 \quad R := 0.3 \quad g := 9.81 \quad \alpha_1 := 10 \cdot deg \quad \alpha_0 := 70 \cdot deg \quad \theta := \alpha_0 - \alpha_1$

$A := -2 \cdot f = -0.3 \quad B := -2 \cdot R \cdot g \cdot f = -0.883 \quad C := 2 \cdot R \cdot g = 5.886$

$$v_1 := \sqrt{v_0^2 \cdot e^{A \cdot (\alpha_1 - \alpha_0)} + \frac{1}{1 + A^2} \cdot \left[(-B - A \cdot C) \cdot \left[\sin(\alpha_1) - e^{A \cdot (\alpha_1 - \alpha_0)} \cdot \sin(\alpha_0) \right] \right] + (C - A - B) \cdot \left[\cos(\alpha_1 \right.}$$

$$t1 := 2 \cdot R \cdot \theta \cdot \left(\frac{1}{v_0 + v_1} \right) = 0.216$$

Участок 2

$v_0 := v_1 = 1.708 \quad f := 0.15 \quad R := 0.3 \quad g := 9.81 \quad \alpha_1 := 10 \cdot deg \quad \alpha_0 := 55 \cdot deg \quad \theta := \alpha_0 - \alpha_1$

$A := -2 \cdot f = -0.3 \quad B := -2 \cdot R \cdot g \cdot f = -0.883 \quad C := 2 \cdot R \cdot g = 5.886$

$$v_1 := \sqrt{v_0^2 \cdot e^{A \cdot (\alpha_1 - \alpha_0)} + \frac{1}{1 + A^2} \cdot \left[(-B - A \cdot C) \cdot \left[\sin(\alpha_1) - e^{A \cdot (\alpha_1 - \alpha_0)} \cdot \sin(\alpha_0) \right] \right] + (C - A - B) \cdot \left[\cos(\alpha_1 \right.}$$

$$t2 := 2 \cdot R \cdot \theta \cdot \left(\frac{1}{v_0 + v_1} \right) = 0.132$$

Участок 3

$v_0 := v_1 = 1.851 \quad f := 0.15 \quad R := 0.3 \quad g := 9.81 \quad S := 0.9 \quad \gamma := 48 \cdot deg$

$$v_1 := \sqrt{v_0^2 + 2 \cdot S \cdot g \cdot (\sin(\gamma) - f \cdot \cos(\gamma))} \qquad t3 := \frac{\sqrt{v_0^2 + 2 \cdot S \cdot g \cdot (\sin(\gamma) - f \cdot \cos(\gamma))} - v_0}{g \cdot (\sin(\gamma) - f \cdot \cos(\gamma))} = 0.57$$

Участок 4

$v_0 := v_1 = 3.844 \quad f := 0.15 \quad R := 0.4 \quad g := 9.81 \quad \alpha_1 := 10 \cdot deg \quad \alpha_0 := 60 \cdot deg$

$A := -2 \cdot f = -0.3 \quad B := -2 \cdot R \cdot g \cdot f = -1.177 \quad C := 2 \cdot R \cdot g = 7.848 \quad \theta := \alpha_0 - \alpha_1$

$$v_1 := \sqrt{v_0^2 \cdot e^{A \cdot (\alpha_1 - \alpha_0)} + \frac{1}{1 + A^2} \cdot \left[(-B - A \cdot C) \cdot \left[\sin(\alpha_1) - e^{A \cdot (\alpha_1 - \alpha_0)} \cdot \sin(\alpha_0) \right] \right] + (C - A - B) \cdot \left[\cos(\alpha_1 \right.}$$

$$t4 := 2 \cdot R \cdot \theta \cdot \left(\frac{1}{v_0 + v_1} \right) = 0.085$$

Суммарное время прохождения детали по лотку

$tсумм := t1 + t2 + t3 + t4 = 1.003 \quad мин$

Скорость детали в конце лотка

$$v := v_1 = 4.386 \quad \frac{м}{с}$$

$$\left(\alpha_1 - \alpha_0\right) - e^{A\cdot\left(\alpha_1-\alpha_0\right)}\cdot\cos\left(\alpha_0\right) = 1.708$$

$$\left(\alpha_1 - \alpha_0\right) - e^{A\cdot\left(\alpha_1-\alpha_0\right)}\cdot\cos\left(\alpha_0\right) = 1.851$$

$$\left(\alpha_1 - \alpha_0\right) - e^{A\cdot\left(\alpha_1-\alpha_0\right)}\cdot\cos\left(\alpha_0\right) = 4.386$$