

Julia Atom

$$\begin{aligned}
& k = 16,9 \text{ км} \\
& 4,7 \cdot V_{\Pi} = V_K \\
& k - x; k + x \\
& (k-x)/\sqrt{k} = x/\sqrt{\Pi} \quad (k+x)/\sqrt{k} = x/\sqrt{\Pi} \\
& (\sqrt{k}-1)x = k \\
& (\sqrt{k}+1)x = k \\
& (\sqrt{k} \pm 1)x = k \\
& (4,7 \pm 1)x = 16,9 \\
& x_1, x_2 = 16,9/(4,7 \pm 1) \\
& ===== \\
& V_r = dr/dt = V_{\Pi} \\
& V_t = r(d\theta/dt) \\
& V_t = \sqrt{(4,7V_L)^2 - (V_L)^2} = \sqrt{21,09} V_L \\
& \{ V_{\Pi} = dr/dt \quad - \\
& \{ r(d\theta/dt) = \sqrt{21,09} V_L \\
& d\theta = \frac{\sqrt{21,09}}{r} dr \\
& \theta = \int \frac{\sqrt{21,09}}{r} dr \\
& \theta = \sqrt{21,09} \cdot \ln(r) + C \\
& ===== \\
& \theta = \text{direction} = 7\pi/4 \\
& \ln(r) = \theta - C/\sqrt{21,09} \\
& r = e^{\frac{\theta - C}{\sqrt{21,09}}}
\end{aligned}$$

Figure 1:

```

1 using Plots
2
3 k = 16.9
4 dv = 4.7
5
6 x1 = k / (dv - 1)
7 x2 = k / (dv + 1)
8 theta1 = 0
9 theta2 = -pi
10
11 dir = -7pi/4
12 t0 = 0:0.15:45
13 f(arg) = dir
14
15 integral(x) = log(x)*sqrt(dv^2 - 1)
16 c1 = theta1 - integral(x1)
17 c2 = theta2 - integral(x2)
18
19 f1(arg) = theta1
20 g1(arg) = integral(arg) + c1
21 f2(arg) = theta2
22 g2(arg) = integral(arg) + c2
23
24 str_mov_1 = x1:0.15:k
25 rnd_mov_1 = x1:0.15:45
26
27 str_mov_2 = x2:0.15:k
28 rnd_mov_2 = x2:0.15:45
29
30 plot(f1(str_mov_1), str_mov_1, color = :red)
31 plot!(g1(rnd_mov_1), rnd_mov_1, color = :red)
32 plot1 = plot!(f.(t0), t0, color = :blue, proj = :polar)
33
34 plot(f2(str_mov_2), str_mov_2, color = :brown)
35 plot!(g2(rnd_mov_2), rnd_mov_2, color = :brown)
36 plot2 = plot!(f.(t0), t0, color = :blue, proj = :polar)
37
38 r1 = exp((dir - c1)/sqrt(dv^2 - 1))
39 r2 = exp((dir - c2)/sqrt(dv^2 - 1))
40
41 plot(plot1, plot2)

```

Figure 2:

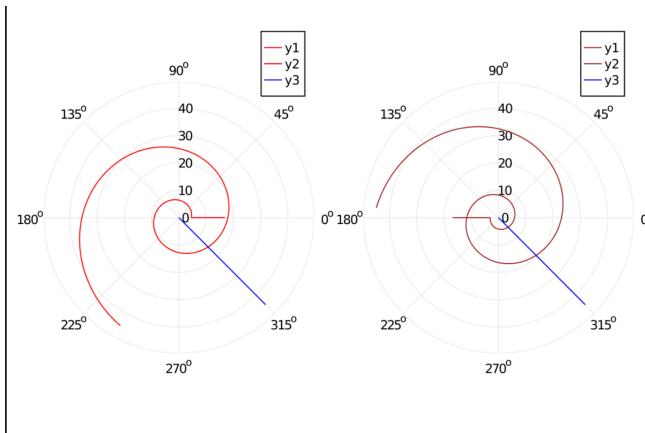


Figure 3: