New rest approach: compute required rest to reach upper-bound

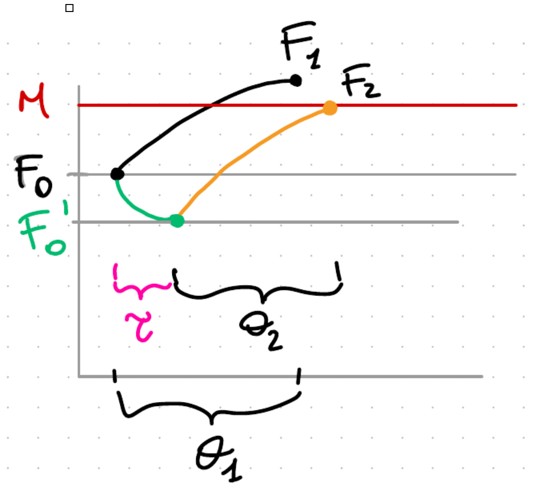
In[1]:=
```
F[t_, R_, p_] := R + (1 - E^(-t*p)) (1 - R)
(*R[τ_,F_,μ_]:=F E^(-μ τ)*)
θ[Fatigue_, Time0_, δ_] := Time0 (1 + δ Log[1 + Fatigue])
```

If a task that starts with fatigue level *F0* ends with a fatigue level greater than *M*, rest *τ* before executing it so that the end fatigue level is exactly *M*

$$F_0' = F_0 e^{-\mu\tau}$$

$$F_2 = F_0' + \left(1-e^{-p\theta_2}\right)\left(1-F_0'\right) = M$$

$$\theta_2 = \hat{\theta}\left(1+\delta \ln\left(1+F_0'\right)\right)$$



In[3]:=
```
(*F0new=R[τ,F0,μ];*)
θ2 = θ[F0prime, θth, δ];
F2 = F[θ2, F0prime, p];
F2 == M
```

Out[5]= $\left(1 - e^{-p\,\theta th\left(1+\delta\,\mathrm{Log}[1+\mathrm{F0prime}]\right)}\right)(1 - \mathrm{F0prime}) + \mathrm{F0prime} == M$

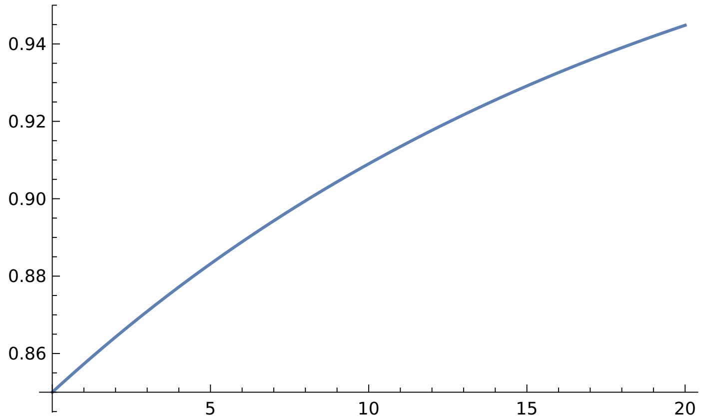
In[6]:=
```
FullSimplify[F2 == M]
```

Out[6]= $M == 1 + e^{-p\,\theta th\left(1+\delta\,\mathrm{Log}[1+\mathrm{F0prime}]\right)}(-1 + \mathrm{F0prime})$

In[7]:=
```
(*Solve[FullSimplify[F2==M],F0prime,
  Assumptions→{p>0&&θth>0&&δ>0&&F0prime≥0&&F0prime<1}]*)
```

Possible scenario (numerical)

In[8]:=
```
Plot[F[t, .85, 0.05], {t, 0, 20}]
```

Out[8]=


In[9]:=
```
θ[.85, 8, 2]
```

Out[9]= 17.843

In[10]:=
```
F[θ[.85, 8, 2], .85, 0.05]
```

Out[10]= 0.938534

In[11]:=
```
tθ2 = θ[F0prime, 8, 2];
tF2 = F[tθ2, F0prime, 0.05];
```

In[13]:=
```
tF2
```

Out[13]= $\left(1 - e^{-0.4\left(1+2\,\mathrm{Log}[1+\mathrm{F0prime}]\right)}\right)(1 - \mathrm{F0prime}) + \mathrm{F0prime}$

In[14]:=
```
Solve[tF2 == .9, F0prime]
```

Out[14]= {{F0prime → 0.764978}}

In[15]:=
```
tF2 /. F0prime → Solve[tF2 == .9, F0prime][[1]][[1]][[2]]
```

Out[15]= 0.9

From F0prime (Rnew) to tau

In[16]:=
```
Solve[Rnew == Rprev * E^(-μ τ), τ, Reals, Assumptions → {Rnew ≥ 0 && Rprev > 0}]
FortranForm@%[[1]][[1]][[2]]
```

Out[16]= $\left\{\left\{\tau \to \frac{\mathrm{Log}\left[\frac{\mathrm{Rprev}}{\mathrm{Rnew}}\right]}{\mu}\right\}\right\}$

Out[17]//FortranForm=

Log(Rprev/Rnew)/μ

In[18]:=