```
In[1]:= ClearAll["Global`*"]

In[2]:= lepkosc[r_, g_, rhok_, rhocieczy_, vgr_, R_] :=
  (2 * r^2 * g * (rhok - rhocieczy)) / (9 * vgr * ((1 + (12 * r) / (5 * R))))

In[3]:= lepkosc[r, g, rhok, rhocieczy, vgr, R]
```

$$\text{Out[3]}= \frac{2\,g\,r^2\,(-\text{rhocieczy}+\text{rhok})}{9\left(1+\frac{12\,r}{5\,R}\right)\text{vgr}}$$

```
In[4]:= pochodnar = D[lepkosc[r, g, rhok, rhocieczy, vgr, R], r]
```

$$\text{Out[4]}= \frac{4\,g\,r\,(-\text{rhocieczy}+\text{rhok})}{9\left(1+\frac{12\,r}{5\,R}\right)\text{vgr}} - \frac{8\,g\,r^2\,(-\text{rhocieczy}+\text{rhok})}{15\left(1+\frac{12\,r}{5\,R}\right)^2 R\,\text{vgr}}$$

```
In[5]:= partialEtaNaPartialr = pochodnar /.
    {r → 0.0015, rhok → 8000, rhocieczy → 1261, vgr → 0.04092, R → 0.02, g → 9.81};

In[6]:= pochodnarhok = D[lepkosc[r, g, rhok, rhocieczy, vgr, R], rhok];

In[7]:= partialEtaNaPartialrhok = pochodnarhok /.
    {r → 0.0015, rhok → 8000, rhocieczy → 1261, vgr → 0.04092, R → 0.02, g → 9.81};

In[8]:= pochodnavgr = D[lepkosc[r, g, rhok, rhocieczy, vgr, R], vgr];

In[9]:= partialEtaNaPartialvgr = pochodnavgr /.
    {r → 0.0015, rhok → 8000, rhocieczy → 1261, vgr → 0.04092, R → 0.02, g → 9.81};

In[10]:= pochodnaR = D[lepkosc[r, g, rhok, rhocieczy, vgr, R], R];

In[11]:= partialEtaNaPartialR = pochodnaR /.
    {r → 0.0015, rhok → 8000, rhocieczy → 1261, vgr → 0.04092, R → 0.02, g → 9.81};

In[12]:= niepewnoscLepkosci[partialEtaNaPartialr_, niepewnoscr_, partialEtaNaPartialrhok_,
   niepewnoscrhok_, partialEtaNaPartialvgr_, niepewnoscvgr_, partialEtaNaPartialR_,
   niepewnoscR_] := Sqrt[partialEtaNaPartialr^2 * niepewnoscr^2 +
    partialEtaNaPartialrhok^2 * niepewnoscrhok^2 +
    partialEtaNaPartialvgr^2 * niepewnoscvgr^2 + partialEtaNaPartialR^2 * niepewnoscR^2]

In[13]:= niepewnoscLepkosci[partialEtaNaPartialr, niepewnoscr,
  partialEtaNaPartialrhok, niepewnoscrhok, partialEtaNaPartialvgr,
  niepewnoscvgr, partialEtaNaPartialR, niepewnoscR]
```

$$\text{Out[13]}= \sqrt{\left(710\,886.\,\text{niepewnoscr}^2 + 27.2618\,\text{niepewnoscR}^2 + 1.03191\times10^{-8}\,\text{niepewnoscrhok}^2 + 279.874\,\text{niepewnoscvgr}^2\right)}$$

```
In[14]:= N[√(710886.2693251926` niepewnoscr^2 + 27.261809314139466` niepewnoscR^2 +
      1.0319122278410456` *^-8 niepewnoscrhok^2 + 279.87391400855125` niepewnoscvgr^2)] /.
   {niepewnoscr → 0.0000051, niepewnoscrhok → 90, niepewnoscvgr → 0.00093,
    niepewnoscR → 0.00015}
```

$$\text{Out[14]}= 0.0185675$$

Niepewność czasu relaksacji dla gliceryny:

```
In[15]:= ClearAll["Global`*"]
```

In[16]:=
```
tau[r_, rhok_, eta_] := 2 r^2 * rhok / (9 * eta)
```

In[17]:=
```
pochodnataur = D[tau[r, rhok, eta], r]
```

Out[17]=
$$\frac{4\ r\ \text{rhok}}{9\ \text{eta}}$$

In[18]:=
```
partialTauNaPartialr = pochodnataur /. {r → 0.0015, rhok → 8000, eta → 0.685}
```

Out[18]=
$$7.78589$$

In[19]:=
```
pochodnataurhok = D[tau[r, rhok, eta], rhok]
```

Out[19]=
$$\frac{2\ r^2}{9\ \text{eta}}$$

In[20]:=
```
partialTauNaPartialrhok = pochodnataurhok /. {r → 0.0015, rhok → 8000, eta → 0.685}
```

Out[20]=
$$7.29927 \times 10^{-7}$$

In[21]:=
```
pochodnataueta = D[tau[r, rhok, eta], eta]
```

Out[21]=
$$-\frac{2\ r^2\ \text{rhok}}{9\ \text{eta}^2}$$

In[22]:=
```
partialTauNaPartialeta = pochodnataueta /. {r → 0.0015, rhok → 8000, eta → 0.685}
```

Out[22]=
$$-0.00852469$$

In[23]:=
```
niepewnoscTau[partialTauNaPartialr_, niepewnoscr_, partialTauNaPartialrhok_,
  niepewnoscrhok_, partialTauNaPartialeta_, niepewnosceta_] :=
 Sqrt[partialTauNaPartialr^2 * niepewnoscr^2 + partialTauNaPartialrhok^2 *
    niepewnoscrhok^2 + partialTauNaPartialeta^2 * niepewnosceta^2]
```

In[24]:=
```
niepewnoscTau[partialTauNaPartialr, niepewnoscr, partialTauNaPartialrhok,
 niepewnoscrhok, partialTauNaPartialeta, niepewnosceta]
```

Out[24]=
$$\sqrt{0.0000726704\ \text{niepewnosceta}^2 + 60.6201\ \text{niepewnoscr}^2 + 5.32793 \times 10^{-13}\ \text{niepewnoscrhok}^2}$$

In[25]:=
```
N[√(0.00007267042442971196` niepewnosceta^2 +
      60.62005316094505` niepewnoscr^2 + 5.327934359848685`*^-13 niepewnoscrhok^2)] /.
 {niepewnoscr → 0.0000051, niepewnoscrhok → 90, niepewnosceta → 0.019}
```

Out[25]=
$$0.000179238$$

In[26]:=
```
ClearAll["Global`*"]
```

In[27]:=
```
tau[r_, rhok_, eta_] := 2 r^2 * rhok / (9 * eta)
```

In[28]:=
```
pochodnataur = D[tau[r, rhok, eta], r]
```

Out[28]=
$$\frac{4\ r\ rhok}{9\ eta}$$

In[29]:=
```
partialTauNaPartialr = pochodnataur /. {r → 0.0015, rhok → 8000, eta → 0.23}
```

Out[29]=
$$23.1884$$

In[30]:=
```
pochodnataurhok = D[tau[r, rhok, eta], rhok]
```

Out[30]=
$$\frac{2\ r^2}{9\ eta}$$

In[31]:=
```
partialTauNaPartialrhok = pochodnataurhok /. {r → 0.0015, rhok → 8000, eta → 0.23}
```

Out[31]=
$$2.17391 \times 10^{-6}$$

In[32]:=
```
pochodnataueta = D[tau[r, rhok, eta], eta]
```

Out[32]=
$$-\frac{2\ r^2\ rhok}{9\ eta^2}$$

In[33]:=
```
partialTauNaPartialeta = pochodnataueta /. {r → 0.0015, rhok → 8000, eta → 0.23}
```

Out[33]=
$$-0.0756144$$

In[34]:=
```
niepewnoscTau[partialTauNaPartialr_, niepewnoscr_, partialTauNaPartialrhok_,
  niepewnoscrhok_, partialTauNaPartialeta_, niepewnosceta_] :=
 Sqrt[partialTauNaPartialr^2 * niepewnoscr^2 + partialTauNaPartialrhok^2 *
    niepewnoscrhok^2 + partialTauNaPartialeta^2 * niepewnosceta^2]
```

In[35]:=
```
niepewnoscTau[partialTauNaPartialr, niepewnoscr, partialTauNaPartialrhok,
 niepewnoscrhok, partialTauNaPartialeta, niepewnosceta]
```

Out[35]=
$$\sqrt{0.00571753\ niepewnosceta^2 + 537.702\ niepewnoscr^2 + 4.7259 \times 10^{-12}\ niepewnoscrhok^2}$$

In[36]:=
```
N[√(0.005717532455930334` niepewnosceta^2 +
     537.7021634110479` niepewnoscr^2 + 4.725897920604914`*^-12 niepewnoscrhok^2)] /.
 {niepewnoscr → 0.0000051, niepewnoscrhok → 90, niepewnosceta → 0.0053}
```

Out[36]=
$$0.000461379$$