

Závislost napětí na tranzistoru na teplotě, Šedivý, P. (2002). Teplotní závislosti fyzikálních veličin. Hradec Králové: MAFY. Dostupné z <http://fyzikalniolympiada.cz/texty/teplota.pdf>

s. 36

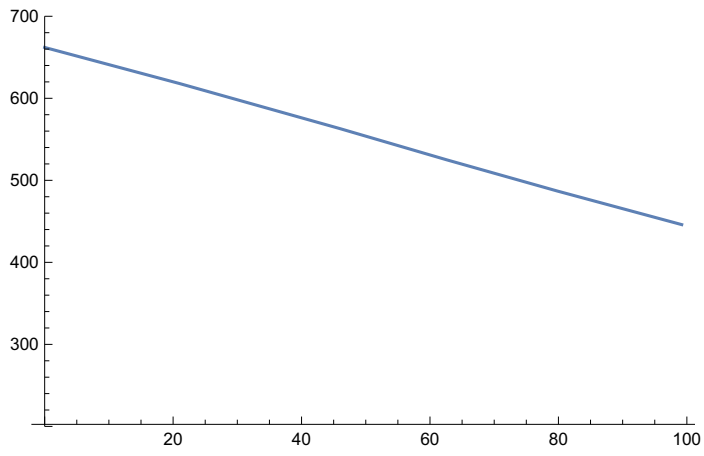
V datech bude první proud, druhá teplota, třetí napětí

```
teplota = {0, 21, 46, 62.6, 79.8, 99.2};
proud = {1, 0.3, 0.1, 0.03, 0.01};
napeti1 = {662, 618, 563, 525, 487, 446};
napeti2 = {632, 586, 528, 489, 448, 406};
napeti3 = {604, 556, 497, 456, 414, 369};
napeti4 = {576, 525, 464, 420, 376, 330};
napeti5 = {548, 496, 433, 388, 342, 294};
data1 = Table[{proud[[1]], teplota[[j]], napeti1[[j]]}, {j, 1, Length[teplota]}]
data2 = Table[{proud[[2]], teplota[[j]], napeti2[[j]]}, {j, 1, Length[teplota]}]
data3 = Table[{proud[[3]], teplota[[j]], napeti3[[j]]}, {j, 1, Length[teplota]}]
data4 = Table[{proud[[4]], teplota[[j]], napeti4[[j]]}, {j, 1, Length[teplota]}]
data5 = Table[{proud[[5]], teplota[[j]], napeti5[[j]]}, {j, 1, Length[teplota]}]
data = Catenate[{data1, data2, data3, data4, data5}]

{{1, 0, 662}, {1, 21, 618}, {1, 46, 563}, {1, 62.6, 525}, {1, 79.8, 487}, {1, 99.2, 446}}
{{0.3, 0, 632}, {0.3, 21, 586}, {0.3, 46, 528},
 {0.3, 62.6, 489}, {0.3, 79.8, 448}, {0.3, 99.2, 406}}
{{0.1, 0, 604}, {0.1, 21, 556}, {0.1, 46, 497},
 {0.1, 62.6, 456}, {0.1, 79.8, 414}, {0.1, 99.2, 369}}
{{0.03, 0, 576}, {0.03, 21, 525}, {0.03, 46, 464},
 {0.03, 62.6, 420}, {0.03, 79.8, 376}, {0.03, 99.2, 330}}
{{0.01, 0, 548}, {0.01, 21, 496}, {0.01, 46, 433},
 {0.01, 62.6, 388}, {0.01, 79.8, 342}, {0.01, 99.2, 294}}

{{1, 0, 662}, {1, 21, 618}, {1, 46, 563}, {1, 62.6, 525}, {1, 79.8, 487},
 {1, 99.2, 446}, {0.3, 0, 632}, {0.3, 21, 586}, {0.3, 46, 528}, {0.3, 62.6, 489},
 {0.3, 79.8, 448}, {0.3, 99.2, 406}, {0.1, 0, 604}, {0.1, 21, 556},
 {0.1, 46, 497}, {0.1, 62.6, 456}, {0.1, 79.8, 414}, {0.1, 99.2, 369},
 {0.03, 0, 576}, {0.03, 21, 525}, {0.03, 46, 464}, {0.03, 62.6, 420},
 {0.03, 79.8, 376}, {0.03, 99.2, 330}, {0.01, 0, 548}, {0.01, 21, 496},
 {0.01, 46, 433}, {0.01, 62.6, 388}, {0.01, 79.8, 342}, {0.01, 99.2, 294}}
```

```
ListLinePlot[Table[{data[[i, 2]], data[[i, 3]]},  
  {i, 0 * Length[teplota] + 1, 1 * Length[teplota]}], PlotRange -> {All, {200, 700}}]
```



(* První graf *)

```
nlinmodel =
```

```
NonlinearModelFit[data, a + (y + 273.15) * (b + c * Log[x]), {a, b, c}, {x, y}];
{nlinmodel["BestFit"], nlinmodel["ParameterTable"], nlinmodel["RSquared"]}
```

```
Show[
```

```
{Plot[nlinmodel["BestFit"] /. x -> 1.0, {y, 0, 100}, PlotStyle -> {Thickness[0.005]},
```

```
FrameLabel -> {"t", "U"}, BaseStyle -> {FontFamily -> "Times", FontSize -> 14},
```

```
GridLines -> Automatic, Frame -> True, PlotRange -> {All, {200, 700}}},
```

```
Plot[nlinmodel["BestFit"] /. x -> .3, {y, 0, 100}],
```

```
Plot[nlinmodel["BestFit"] /. x -> .1, {y, 0, 100}],
```

```
Plot[nlinmodel["BestFit"] /. x -> .03, {y, 0, 100}],
```

```
Plot[nlinmodel["BestFit"] /. x -> .01, {y, 0, 100}],
```

```
ListPlot[Table[{data[[i, 2]], data[[i, 3]]},
```

```
{i, 0 * Length[teplota] + 1, 1 * Length[teplota]}],
```

```
PlotMarkers -> {Automatic, Small}, PlotStyle -> {Red}],
```

```
ListPlot[Table[{data[[i, 2]], data[[i, 3]]},
```

```
{i, 1 * Length[teplota] + 1, 2 * Length[teplota]}],
```

```
PlotMarkers -> {Automatic, Small}, PlotStyle -> {Red}],
```

```
ListPlot[Table[{data[[i, 2]], data[[i, 3]]},
```

```
{i, 2 * Length[teplota] + 1, 3 * Length[teplota]}],
```

```
PlotMarkers -> {Automatic, Small}, PlotStyle -> {Red}],
```

```
ListPlot[Table[{data[[i, 2]], data[[i, 3]]},
```

```
{i, 3 * Length[teplota] + 1, 4 * Length[teplota]}],
```

```
PlotMarkers -> {Automatic, Small}, PlotStyle -> {Red}],
```

```
ListPlot[Table[{data[[i, 2]], data[[i, 3]]},
```

```
{i, 4 * Length[teplota] + 1, 5 * Length[teplota]}],
```

```
PlotMarkers -> {Automatic, Small}, PlotStyle -> {Red}}]
```

```
{1258. + (273.15 + y) (-2.18196 + 0.0890593 Log[x]),
```

	Estimate	Standard Error	t-Statistic	P-Value
a	1258.	2.18828	574.88	9.9222×10^{-57}
b	-2.18196	0.00677818	-321.909	6.24257×10^{-50} , 0.999994}
c	0.0890593	0.000425212	209.447	6.81037×10^{-45}

