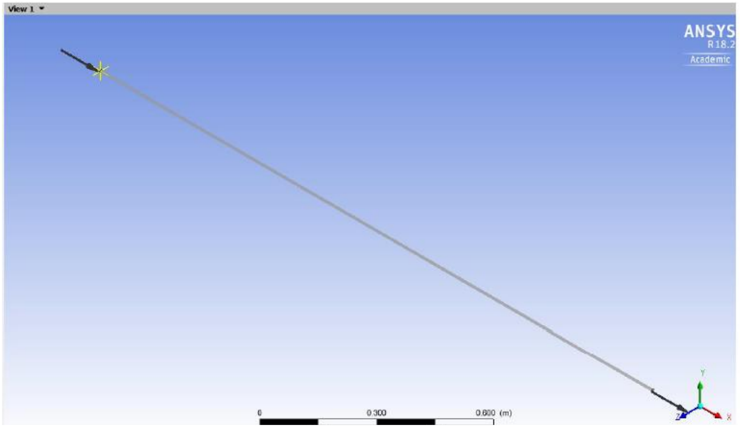
# Common mistakes in reports

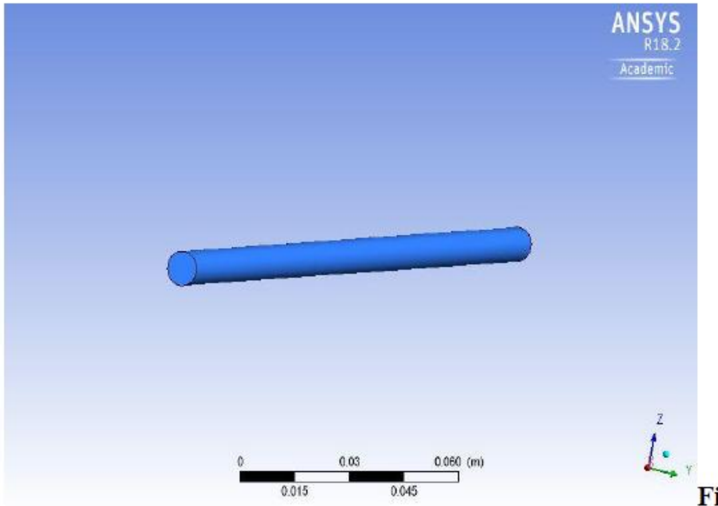
HR EXCELLENCE IN RESEARCH

Wrocław University of Science and Technology

# Ambiguous figures

| BAD | GOOD |
| --- | --- |

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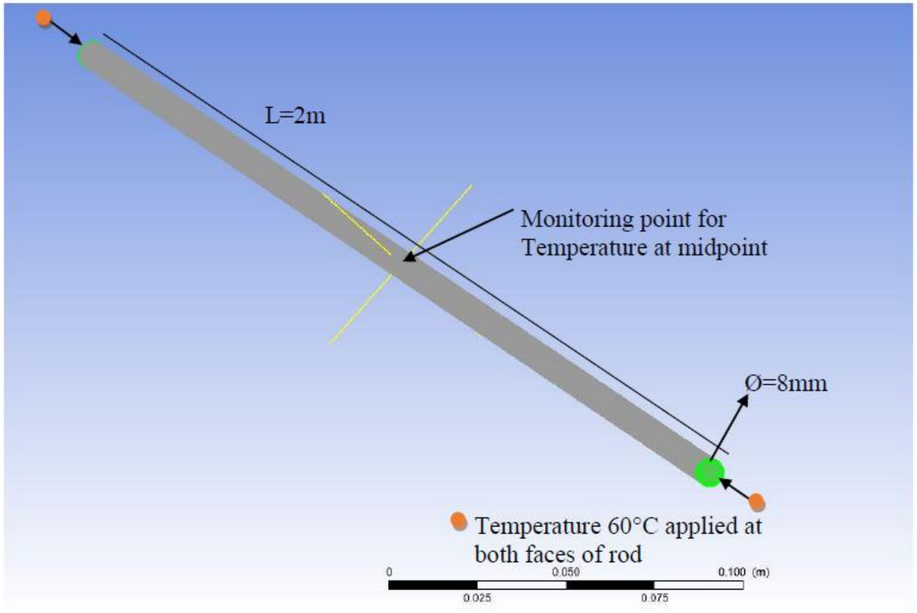
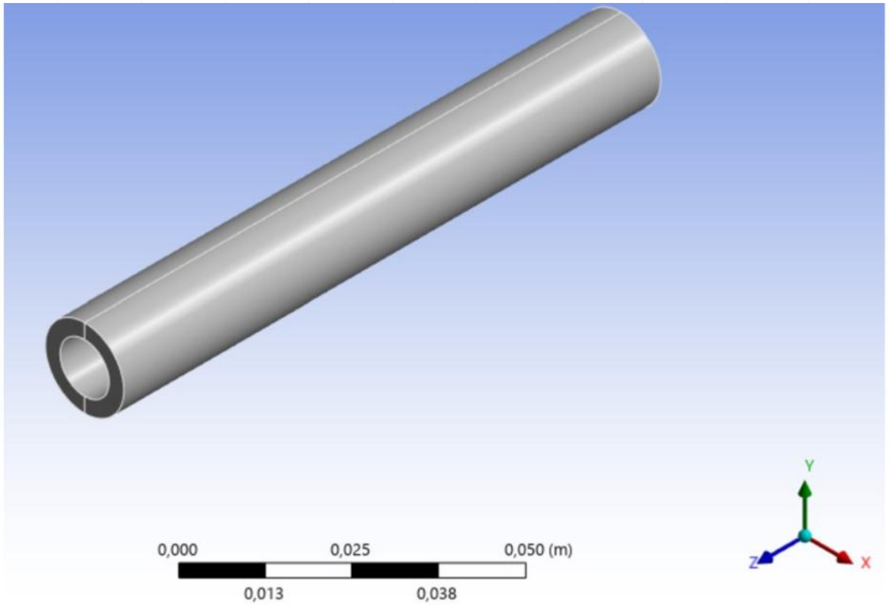
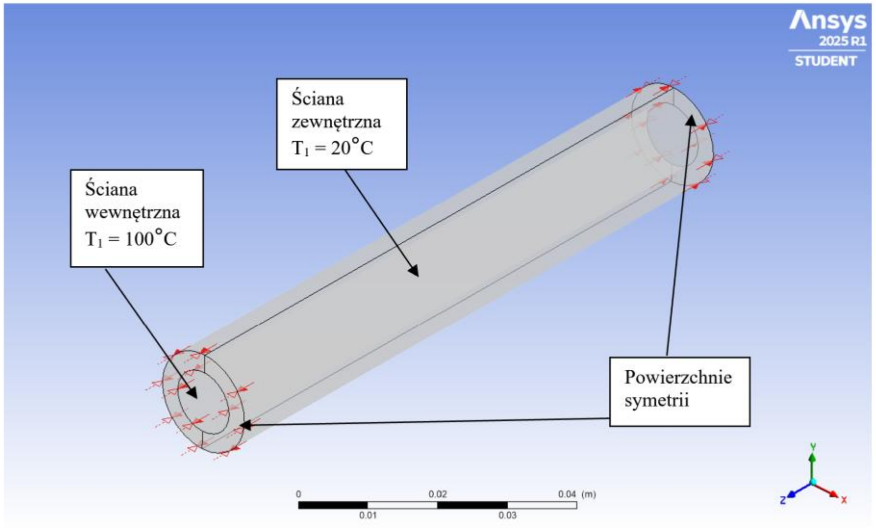


# Ambiguous figures

| BAD | GOOD |
|---|---|



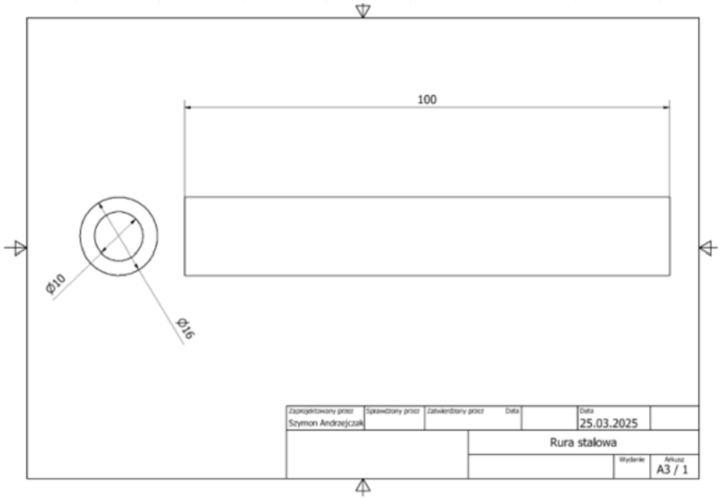

*Rysunek 1. Schemat zagadnienia nieustalonego przewodzenia ciepła*

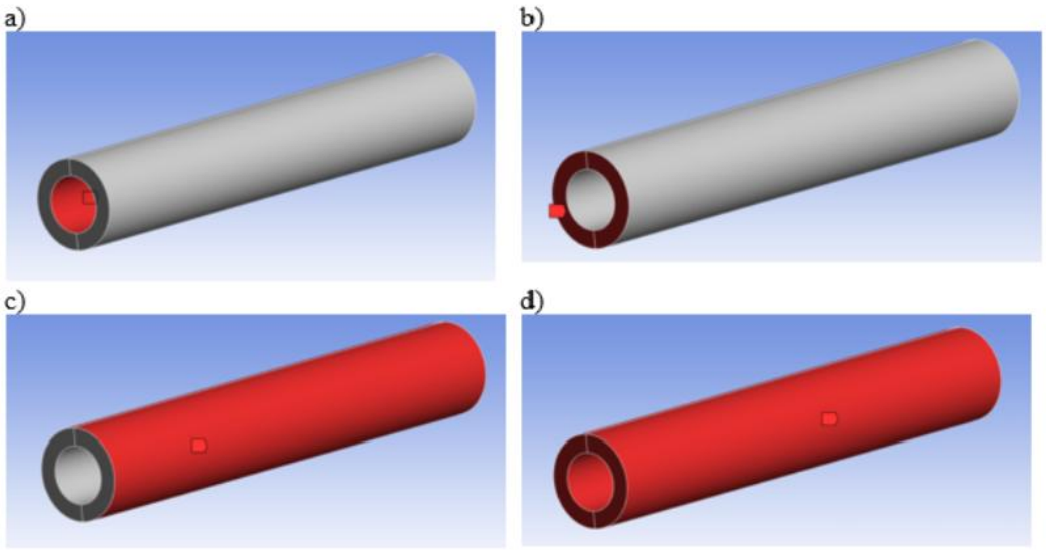



Rys. 1. Model geometryczny dla zagadnienia nieustalonego przewodzenia ciepła w przegrodzie cylindrycznej

# Ambiguous figures

VERY GOOD



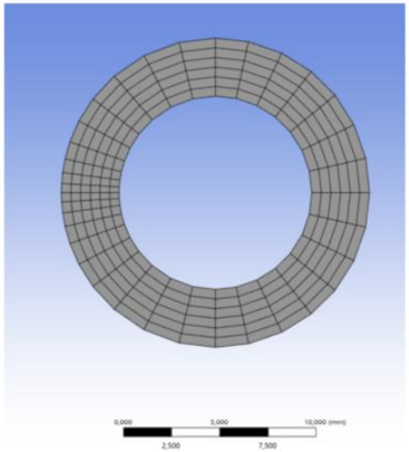

Rys. 5 Nazwy nadane powierzchniom i objętości: a) inner; b) side; c) outer; d) solid domain

Tab. 1 Warunki brzegowe zastosowane podczas obliczeń.

| Nazwa powierzchni | Typ warunku brzegowego | Wartość | Jednostka |
|---|---|---|---|
| Outer | Wall | 20 | °C |
| Inner | Wall | 100 | °C |
| Side | Symmetry | - | - |

# Ambiguous figures

VERY GOOD



Rys.5. Siatka numeryczna na ściance bocznej

Tab.1. Zestawienie parametrów siatki numerycznej

| Minimalny rozmiar elementu | Ilość elementów | Ilość węzłów | Kształt elementu |
|---|---|---|---|
| 3 mm | 204 | 476 | Hex8 |

Tab.2. Zestawienie parametrów jakościowych siatki

| Minimalna jakość siatki | Maksymalna jakość siatki | Średnia jakość siatki |
|---|---|---|
| 8,1248E-05 | 4,8732E-04 | 3,0968E-04 |

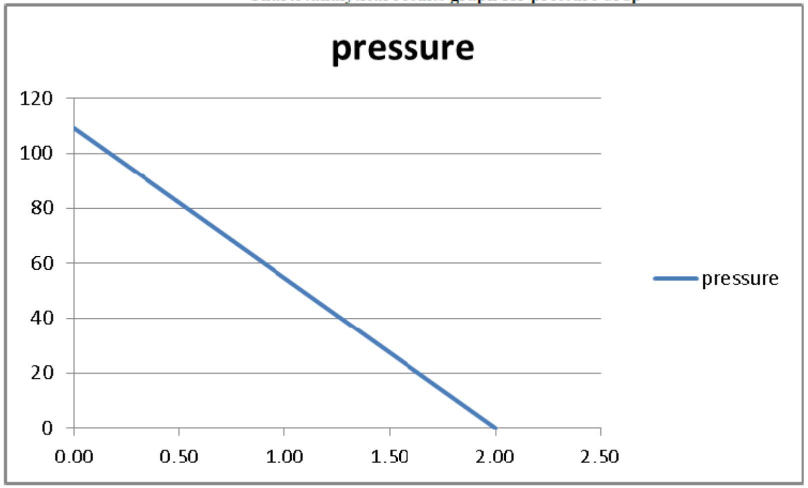
Tab.3. Właściwości fizyczne stali

| | | | |
|---|---|---|---|
| Symbol | λ | ρ | c |
| Nazwa | Przewodność cieplna | Gęstość | Ciepło właściwe |
| Jednostka | W/(mK) | kg/m³ | J/(kgK) |
| Wartość | 40 | 7900 | 460 |

# Poor figures

## BAD

Chart3:analytical results graph for pressure drop




## GOOD

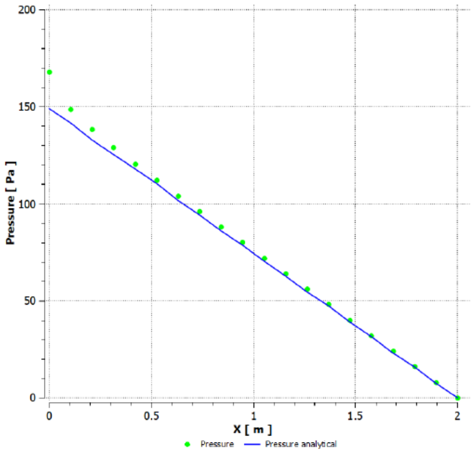



Figure 10 Distribution of Pressure drop along the pipe, values obtained by simulation in ANSYS CFX (green points) and analytical ways (blue continuous line)

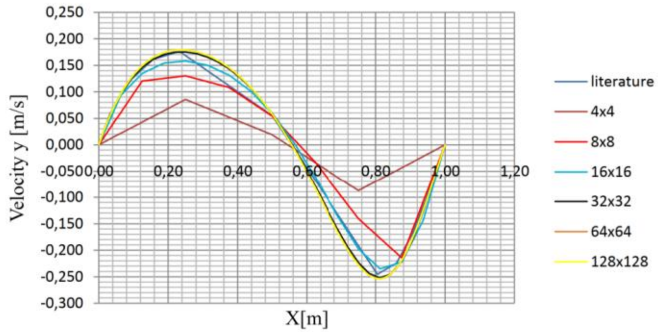



Fig. 20. The value of x velocity component

# Different figures (style)

## BAD

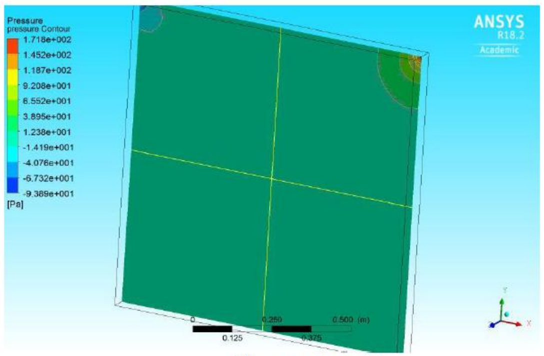



Fig. pressure contour

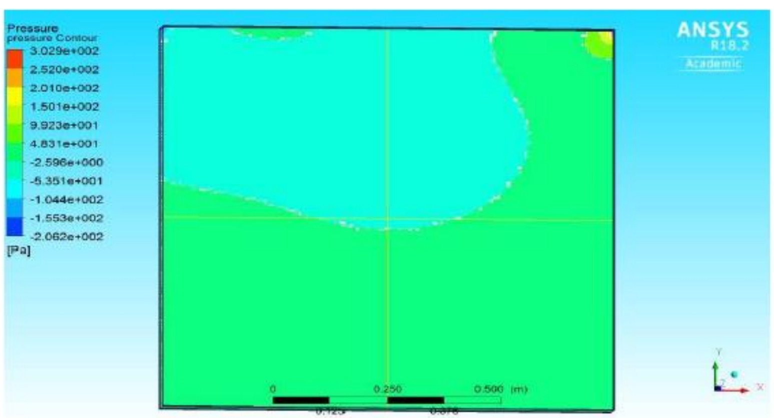
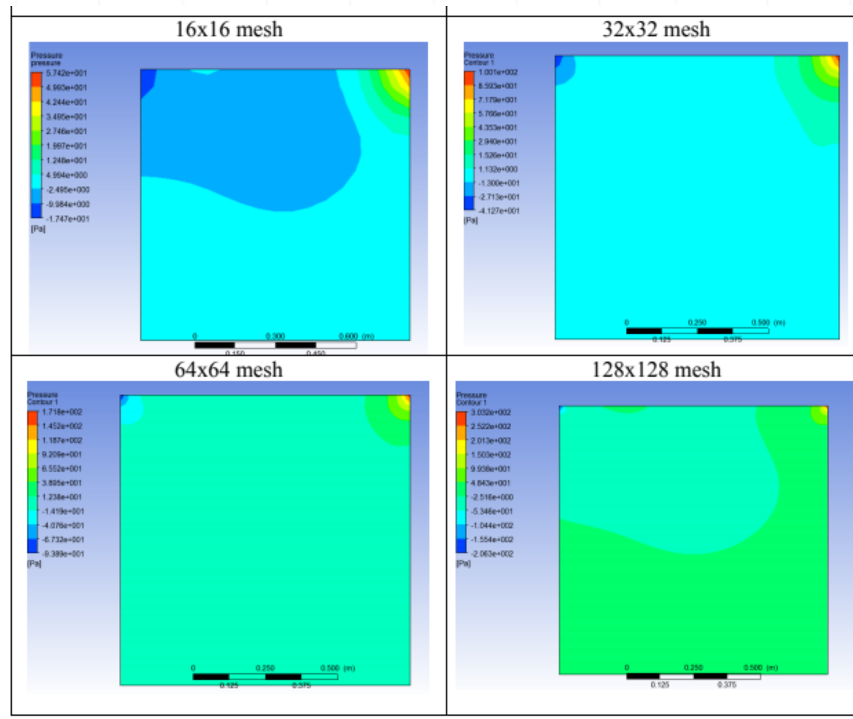



Fig. pressure contour

## GOOD (but not perfect)



# Poor Discussion

## BAD

**From the above , we can consider that** ;

1. Temperature in the pipes due to the flowing fluid increases and temperature of walls and absorber also increases in laminar and turbulent flow.
2. As the temperature increases the pressure reduces.
3. We can observe that in straight pipe flow is maximum where as in corners the flow reduces.

## GOOD

In Table 3 is shown the values of temperature in the aluminum rod along its length, the second column shows the temperature obtained by the simulation in ANSYS CFX (using the hexagonal mesh provided by the lecturer) and the third column shows the temperature obtained using the corresponding equation mentioned in the introduction of this report (analytical solution). In Table 3, also is reported the percental error of the different values of temperature during simulation. This temperature distribution obtained during simulation is represented as a chart in Figure 8.

It is relevant to highlight that the maximum amount of percental error obtained during simulation for the temperature distribution along the aluminum rod was 0.1174%. This fact indicates that the simulation was accurate to predict the temperature distribution in the studied system and it can be useful to model and solve similar problems with the same system.

The studied system was accurately modeled from the point of view of thermodynamic with the variables used during simulation, this indicates that other variables that did not were considered, like the contribution of radiation to the heat flow from the rod, are not significan to describe the system.

It is interesting to observe that the percental error varies with the position in the rod, being higher in the zones near the extremes (0.2 - 0.5 m of distance from each end) and lower in the ends themselves and in the middle of the rod. Even though this error is not considerably important, it could be reduced by modifying the mesh used during simulation, increasing the number of elements in these error zones.

# Poor Conclusions

## BAD

**4.CONCLUSIONS**

The exercise divided into two parts:

1. when the rod is heated on both the ends.
2. flow through the pipe.

In the exercise the flow is laminar.

Analysing the results and graphs it can be seen that the results from CFX and analytical results are very similar for both temperature and pressure distribution also the errors are very small.

## GOOD

**4. CONCLUSIONS**

- The simulation of the heating of an aluminum rod was performed using ANSYS CFX with relative accuracy based on the low relative errors, comparing with the analytical solution, obtained of the distribution of the temperature of the rod in steady state (maximum percental error of 0.1174%). Thus, ANSYS CFX can be used to predict the behavior of the system and similar systems
- It was found that the expression "areaInt(*Wall Heat Flux*)@" was not useful to calculate the heat flow through the walls of the rod, probably because the hexagonal mesh used does not have enough quality to perform this operation
- The simulation of water flowing through a pipe was performed using ANSYS CFX and it was found that this simulation could predict the distribution of pressure drop with accuracy. Also It was found that the simulation was useful to observe the trend of a velocity profile in the transect section of the flowing fluid but the values of velocity was not accurate (minimum relative error respect analytical solution of 0.94)

# Numbering equations

| BAD | GOOD |
|---|---|
| $T(x) = \frac{\Theta_p \cosh\left[m\left(\frac{L}{2} - x\right)\right]}{\cosh\left(\frac{mL}{2}\right)} + t_0$ | $T(x) = \frac{\Theta_p \cosh\left[m\left(\frac{L}{2} - x\right)\right]}{\cosh\left(\frac{mL}{2}\right)} + t_0 \qquad (1)$ |

# Numbering tables

**BAD**

Given data: Input data for heating rod analysis

| Quantity | Value |
|---|---|
| Rod/pipe length L | 2 m |
| Rod/pipe diameter d | 0.008 m |
| Ambient temperature $t_o$ | 20 °C |
| Temperature of the rod base $t_p$ | 90 °C |
| Reynolds number Re | 1100 |
| Density of water $\rho$ | 997 kg/ms |
| Dynamic viscocity of water $\eta$ | 0.008899 |
| Heat transfer coefficeint α | 15 W / (m²) |

**GOOD**

Tab. 1 Input data for heating rod analysis

| **Quantity** | **Value** |
|---|---|
| Rod/pipe length L | 2 m |
| Rod/pipe diameter d | 0,008 m |
| Ambient temperature $t_o$ | 20 °C |
| Temperature of the rod base $t_p$ | 120 °C |
| Heat transfer coefficeint α | 15 W / (m² K) |

# Correct equations

| BAD | GOOD |
| --- | --- |
| Formula : (8*ETA*L*Q)/(Π*r^4) | $\Delta p = \frac{8\mu LQ}{\pi d^2}$ (3) |

# Other - sloppiness

BAD

**Table of Contents**


**1. Introduction** ........................................................ **2**

**2. Numerical model** ........................................ Error! Bookmark not defined.

**3. Results and discussion** ................................ Error! Bookmark not defined.

**4. Conclusions** ........................................................ **13**

**5. References** ........................................ Error! Bookmark not defined.

# Other - sloppiness

BAD

3. Results and discussion

Re100 mesh 128x128

| Nr punktu | y<br>m | velocity_u<br>[1]<br>m/s | Velocity u (CFX)<br>m/s | ε<br>% | Nr punktu | x<br>m | velocity_v<br>[1] | velocity v<br>(CFX)<br>m/s | ε<br>% |
|---|---|---|---|---|---|---|---|---|---|
| 129 | 1 | 1 | 1 | 0 | 129 | 1 | 0 | -8.8599E-10 | 0 |
| 126 | 0.9766 | 0.84123 | 0.84243834 | -0.14 | 125 | 0.9688 | -0.05906 | -0.06046132 | -2.37 |
| 125 | 0.9688 | 0.78871 | 0.790057659 | -0.17 | 124 | 0.9609 | -0.07391 | -0.07557429 | -2.25 |
| 124 | 0.9609 | 0.73722 | 0.738681197 | -0.20 | 123 | 0.9531 | -0.08864 | -0.09049106 | -2.09 |
| 123 | 0.9531 | 0.68717 | 0.688706279 | -0.22 | 122 | 0.9453 | -0.10313 | -0.10512 | -1.93 |
| 110 | 0.8516 | 0.23151 | 0.22933808 | 0.94 | 117 | 0.9063 | -0.16914 | -0.1708982 | -1.04 |
| 95 | 0.7344 | 0.00332 | -0.007080388 | 313.26 | 111 | 0.8594 | -0.22445 | -0.22430058 | 0.07 |
| 80 | 0.6172 | -0.13641 | -0.146904051 | -7.69 | 104 | 0.8047 | -0.24533 | -0.24209875 | 1.32 |
| 65 | 0.5 | -0.20581 | -0.206489414 | -0.33 | 65 | 0.5 | 0.05454 | 0.056190535 | -3.03 |
| 59 | 0.4531 | -0.2109 | -0.207343608 | 1.69 | 31 | 0.2344 | 0.17527 | 0.17048496 | 2.73 |
| 37 | 0.2813 | -0.15662 | -0.14797762 | 5.52 | 30 | 0.2266 | 0.17507 | 0.170267999 | 2.74 |
| 23 | 0.1719 | -0.1015 | -0.095979825 | 5.44 | 21 | 0.1563 | 0.16077 | 0.156294167 | 2.78 |
| 14 | 0.1016 | -0.06434 | -0.061302461 | 4.72 | 13 | 0.0938 | 0.12317 | 0.119800687 | 2.74 |
| 10 | 0.0703 | -0.04775 | -0.04458354 | 6.63 | 11 | 0.0781 | 0.1089 | 0.105965555 | 2.69 |
| 9 | 0.0625 | -0.04192 | -0.040185832 | 4.14 | 10 | 0.0703 | 0.10091 | 0.098225668 | 2.66 |
| 8 | 0.0547 | -0.03717 | -0.035680793 | 4.01 | 9 | 0.0625 | 0.09233 | 0.089909524 | 2.62 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

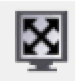
Tab2. Relative error with actual value and practical value

# Other – copy paste from instruction

## BAD

The process of a hexagonal mesh generation in the ANSYS ICEM software

1. From the START menu choose *ANSYS 14.5 > Meshing > ICEM CFD 14.5*
2. Save the first project as „4x4" inside folder „4x4".
3. Inside the „Geometry" tab choose „Create Point" and the icon 

4. Create eight points with the following coordinates: (0,0,0), (1,0,0), (0,1,0), (1,1,0), (0,0,0.1), (1,0,0.1), (0,1,0.1), (1,1,0.1). To accept the point creation use the middle mouse button (MMB). If the created point is not visible on the screen use the „Fit window"  button.

# Other – stars or dots in equations

BAD

$$P_o = \frac{8 * \eta * L * Q}{\pi * R^4} + P_i$$

# Other – references

BAD

References:

https://en.wikipedia.org/wiki/Hagen%E2%80%93Poiseuille_equation

# Other – strange styles

BAD

## 2. **<u>LAMINAR Flow through a pipe-</u>**

1. Load the numerical mesh
2. Create a domain with the following options:
    a. Domain type: Fluid
    b. Material: Water
    c. Pressure: 1 atm
    d. Fluid models: Heat Transfer: None
    e. Fluid models: Turbulence: Lamina

# Other

## BAD

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| R | 1150 | | | | | | |
| Eta | 0.00089 | | | | | | |
| Rho | 997 | | | | | | |
| d | 0.008 | | | | | | |
| U | 0.128322 | m/s | | | | | |

$$U_{inlet} = \frac{Re^* \eta}{\rho^* d}$$

**3. RESULTS AND DISSCUSSION**

**RESULTS COMPAIRING NUMERICAL AND ANALYTICAL TEMPRATURE IN ROD**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ROD | | | | | | | | | |
| Series 1 at /LINE:Line 1 | | | | | | | | | |
| | | | | | | | | | |
| [Data ] | **NUMERICAL** | **ANALITICAL** | | | | | | | |
| X [ m ] | T(K) | T(K) | theta(p) | Diameter | cross section | perimeter | LAMDA | ALFA | m |
| 0 | 119.96 | 120 | 100 | 0.008 | 5.03E-05 | 0.025133 | 237 | 15 | 5.62544 |
| 0.1 | 76.89 | 76.98 | | | | | | | |
| 0.2 | 52.38 | 52.47 | | | | | | | |
| 0.3 | 38.43 | 38.5 | | | | | | | |
| 0.4 | 30.5 | 30.55 | | | | **Q** | | | |
| 0.5 | 25.99 | 26.03 | | | | **13.40273** | | | |
| 0.6 | 23.43 | 23.46 | | | | | | | |
| 0.7 | 22 | 22.02 | | | | | | | |
| 0.8 | 21.22 | 21.23 | | | | | | | |
| 0.9 | 20.83 | 20.84 | | | | | | | |
| 1 | 20.71 | 20.72 | | | | | | | |
| 1.1 | 20.83 | 20.84 | | | | | | | |
| 1.2 | 21.22 | 21.23 | | | | | | | |
| 1.3 | 22 | 22.02 | | | | | | | |
| 1.4 | 23.44 | 23.46 | | | | | | | |
| 1.5 | 25.99 | 26.03 | | | | | | | |
| 1.6 | 30.51 | 30.55 | | | | | | | |
| 1.7 | 38.44 | 38.5 | | | | | | | |
| 1.8 | 52.4 | 52.47 | | | | | | | |
| 1.9 | 76.93 | 76.98 | | | | | | | |
| 2 | 119.96 | 120 | | | | | | | |

Tab.3

SO , HEAT TRANSFER RATE RELEASED BY THE ROD IS Q =13.4

# Summury

## In the reports

- Number equations, tables and figures
- Stick to the editorial requirements
- Report should look good
- Write your own words
- Provide precise self-explanatory figures
- In Results and discussion write what you see and provide interpretation

# Summury

## In the reports

- 1) przy opisie modelu numerycznego trzeba podać wszystkie ustawienia jakie się dało
- 2) odnosimy się do numerów rysunków i tabel w tekście
- 3) numerujemy po kolei rysunki i tabele
- 4) dyskusja wyników powinna zawierać prezentację tego co jest na rysunkach, tabelach itp. a następnie podanie
- co tam się dzieje, jakie to ma znaczenie, czy jest poprawne, itp.
- 5) W podsumowaniu należy podsumować pracę