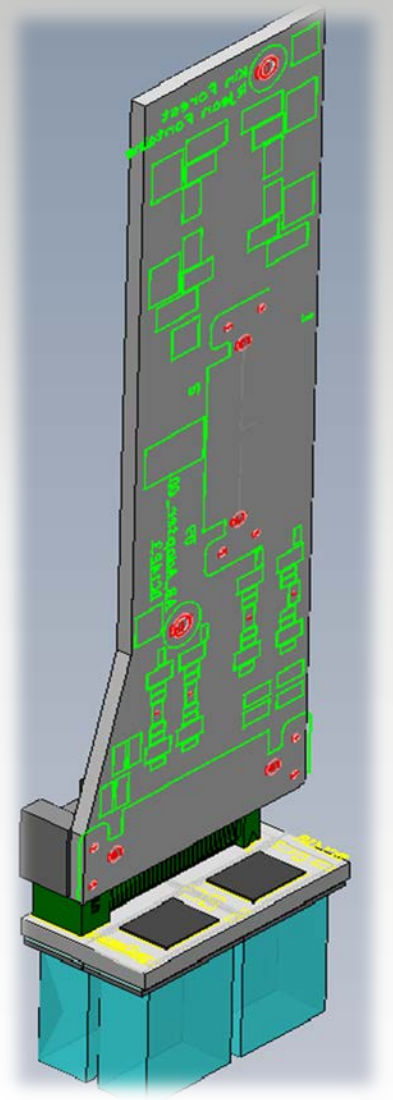
UQO

COMSOL CONFERENCE 2015 BOSTON

Development of a Thermal Model Using COMSOL Multiphysics® Software



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8th October 2015

COMSOL Conference 2015 Boston

The agenda

- The presentation of the first simulation of the eight ABDM in COMSOL tool.
- Why do we need the thermal analysis by the convection method?
- The two results of thermal convection analysis in COMSOL.
- Conclusion.

The presentation of first simulation of the eight ABDM in COMSOL Tool

- The thermal model in COMSOL of the eight ABDM Diapositive 9
- Thermal evolution of the first simulation of the eight ABDM in COMSOL Diapositive 12

Why do we need the thermal analysis by the convection method?

- Thermal analysis by :

  - Free convection.
  - Forced convection.

- The different coefficients of thermal analysis by convection Diapositive 11

The two results of thermal convection analysis in COMSOL

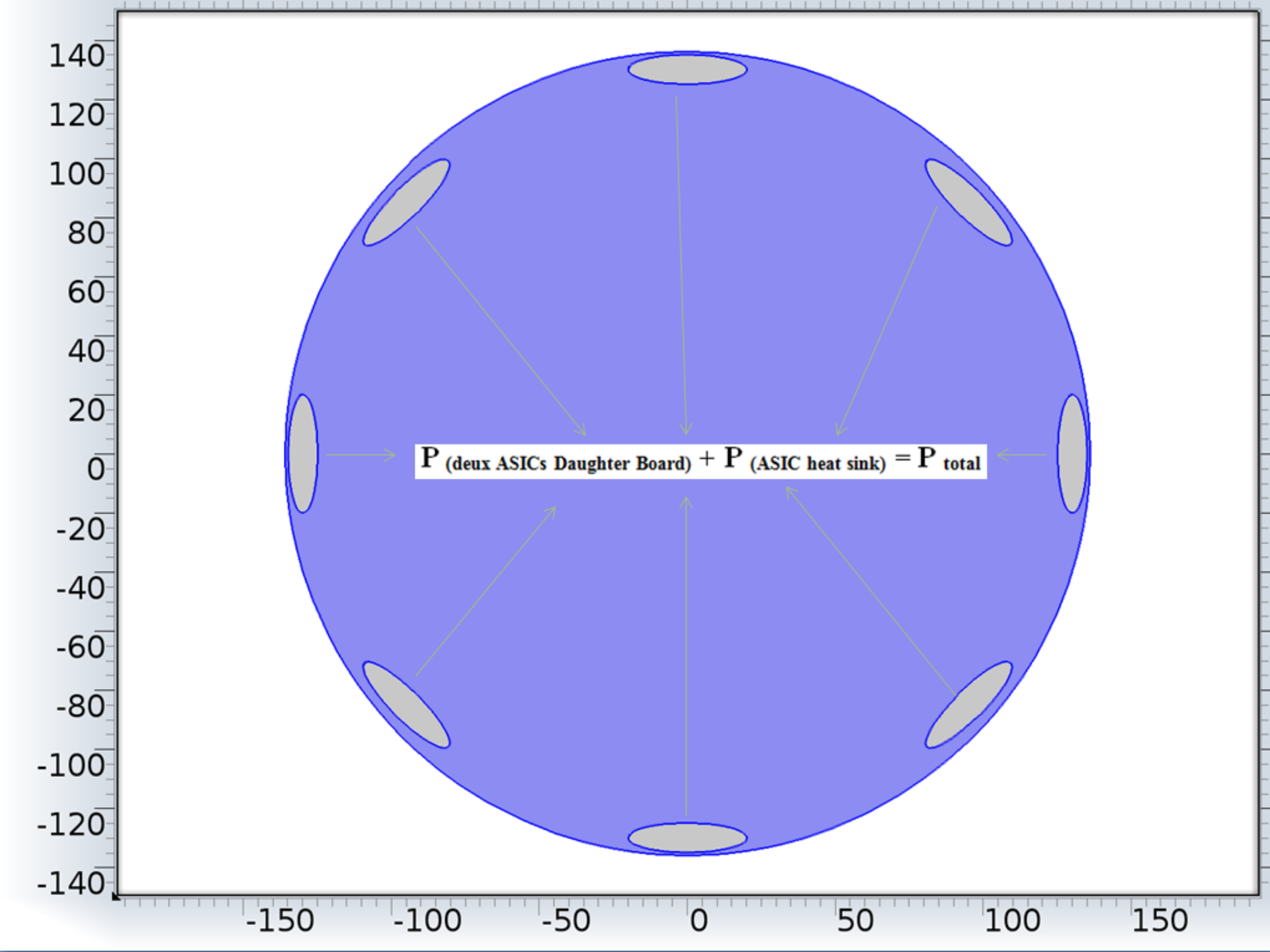
- The thermal evolution by using free convection in COMSOL Diapositive 12
- The thermal evolution by using forced convection in COMSOL Diapositive 13
- The simulation graph of simple thermal model LabPET II Diapositive 14

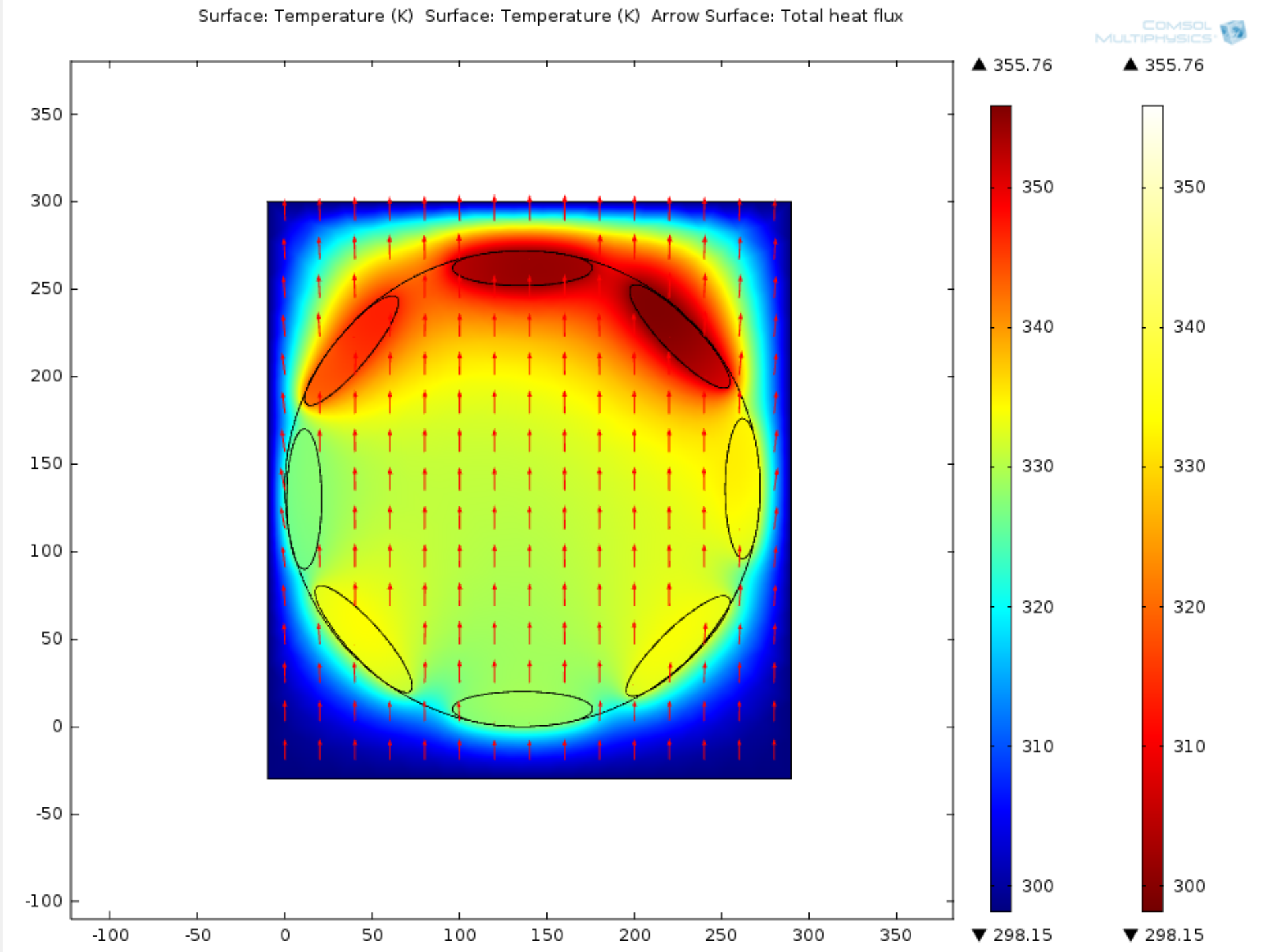
CONCLUSION

- The several advantages of thermal analysis with the use of the convection methodology in COMSOL tool.
- The importance of this work to establish a strong and effective strategy in order to make a future work.

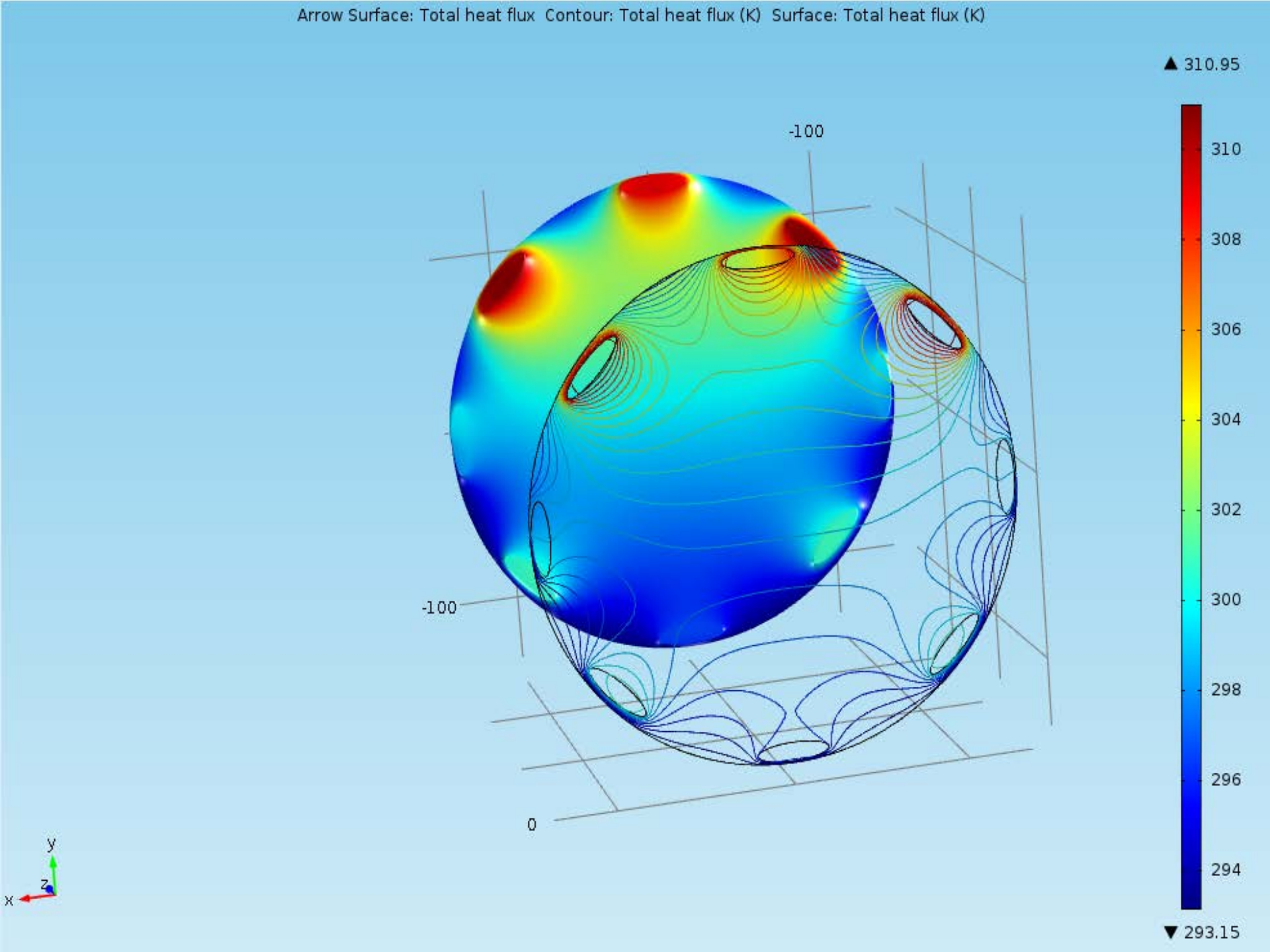

Questions

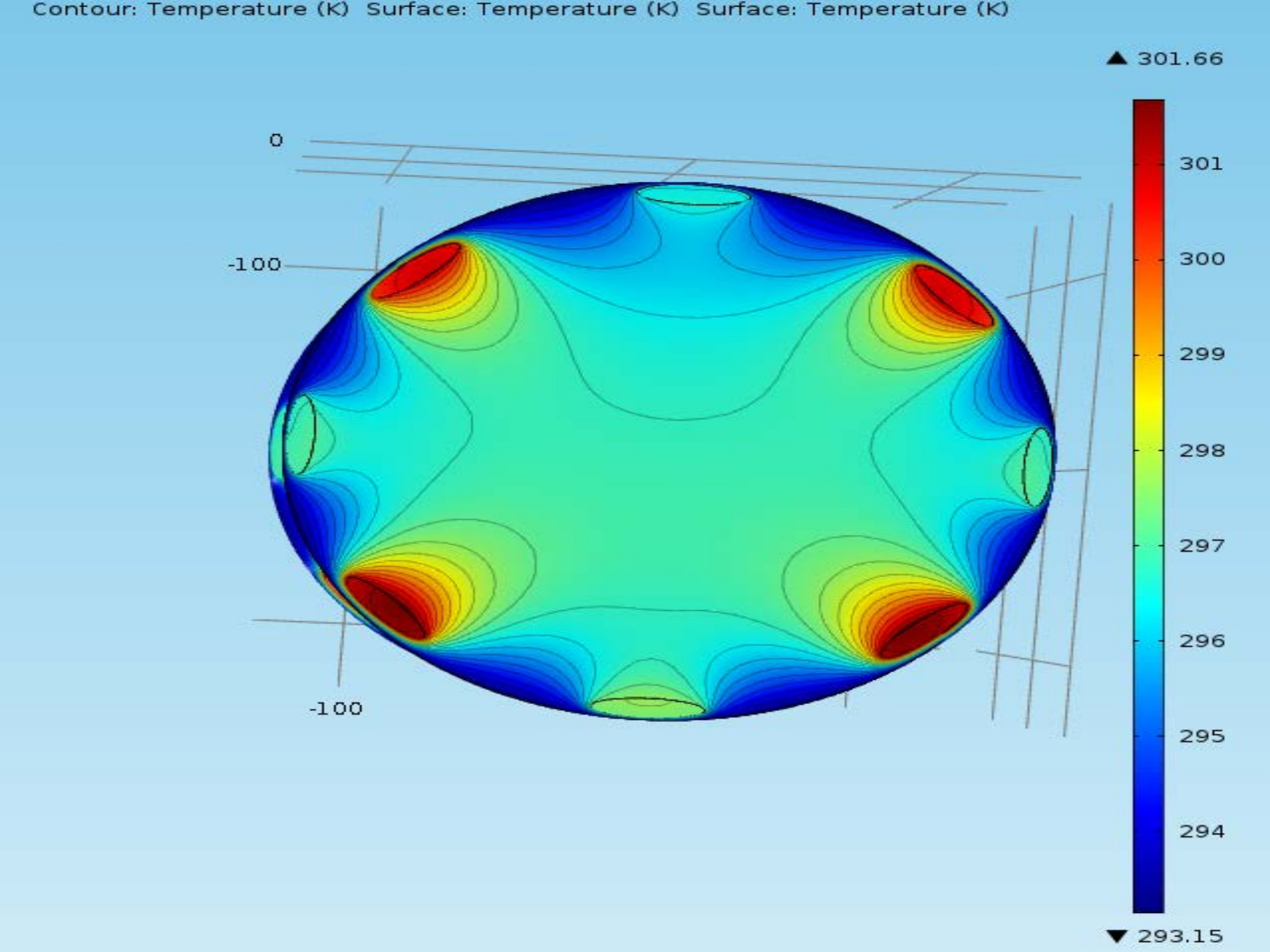
THANK YOU FOR YOUR ATTENTION

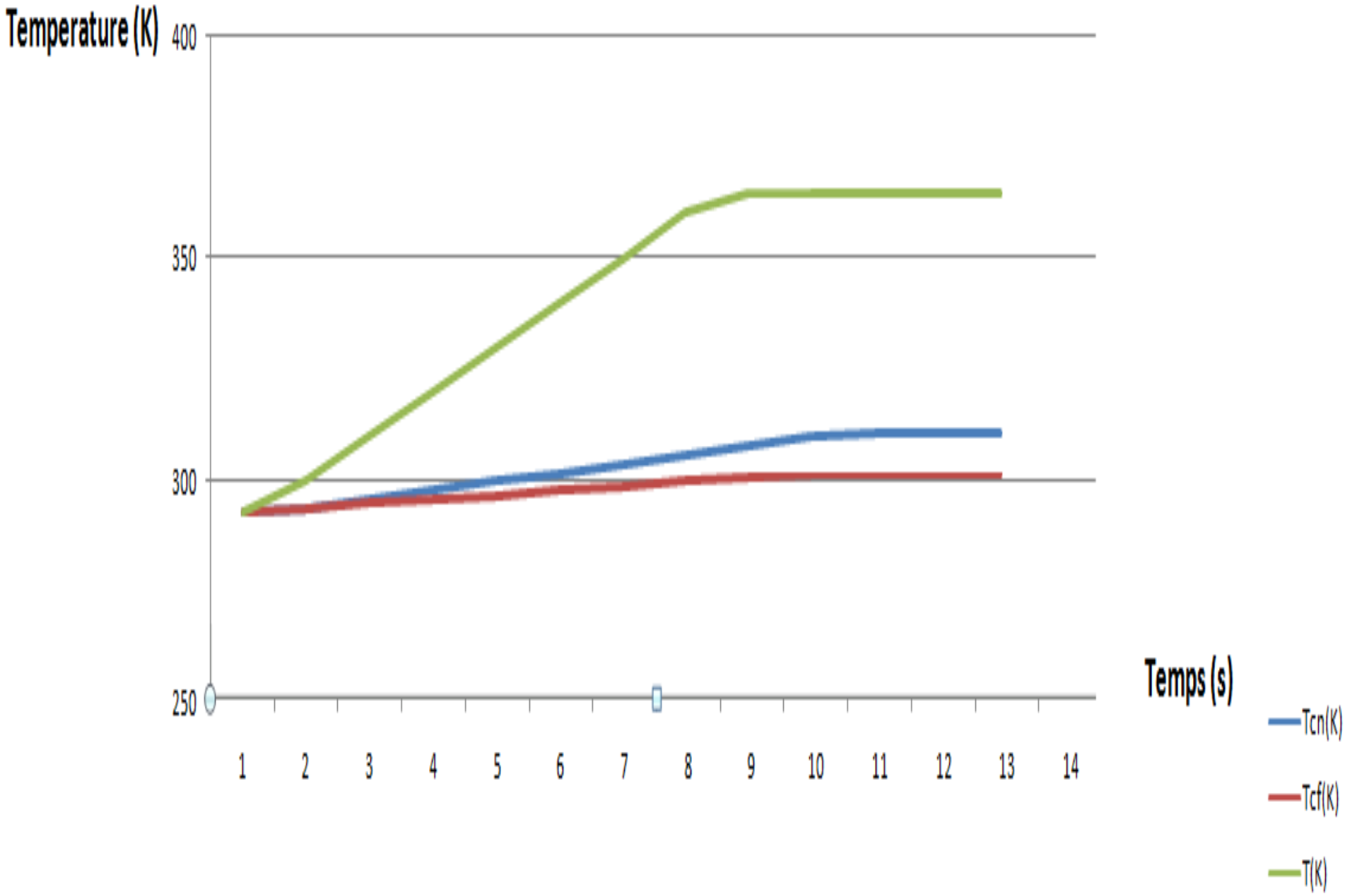

140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-150
-100
-50
0
50
100
150
P (deux ASICs Daughter Board) + P (ASIC heat sink) = P total


Surface: Temperature (K) Surface: Temperature (K) Arrow Surface: Total heat flux
COMSOL MULTIPHYSICS
▲ 355.76
350
340
330
320
310
300
▼ 298.15
▲ 355.76
350
340
330
320
310
300
▼ 298.15
350
300
250
200
150
100
50
0
-50
-100
-100
-50
0
50
100
150
200
250
300
350

Cooling Type	Heat Transfer Coefficient [c] ($W/m^2 K$)	Comments
Radiation	$<kW/m^2$	Black body radiation at 120° C with environment at room temperature
Air, free convection	3-12	Typically about 5
Air, forced convection	10-100	Typically about 50
Liquid, forced convection	200-2000	Fluorocarbons
Liquid, forced convection	2000-7000	Water and Water/glycol mixtures
Boiling	2000-6000	Fluorocarbons
Boiling	50000	Water


Arrow Surface: Total heat flux Contour: Total heat flux (K) Surface: Total heat flux (K)
▲ 310.95
310
308
306
304
302
300
298
296
294
▼ 293.15
-100
-100
0
y
z
x


Contour: Temperature (K) Surface: Temperature (K) Surface: Temperature (K)
▲ 301.66
301
300
299
298
297
296
295
294
▼ 293.15
0
-100
-100


Temperature (K)
400
350
300
250
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Temps (s)
Tcn(K)
Tcf(K)
T(K)