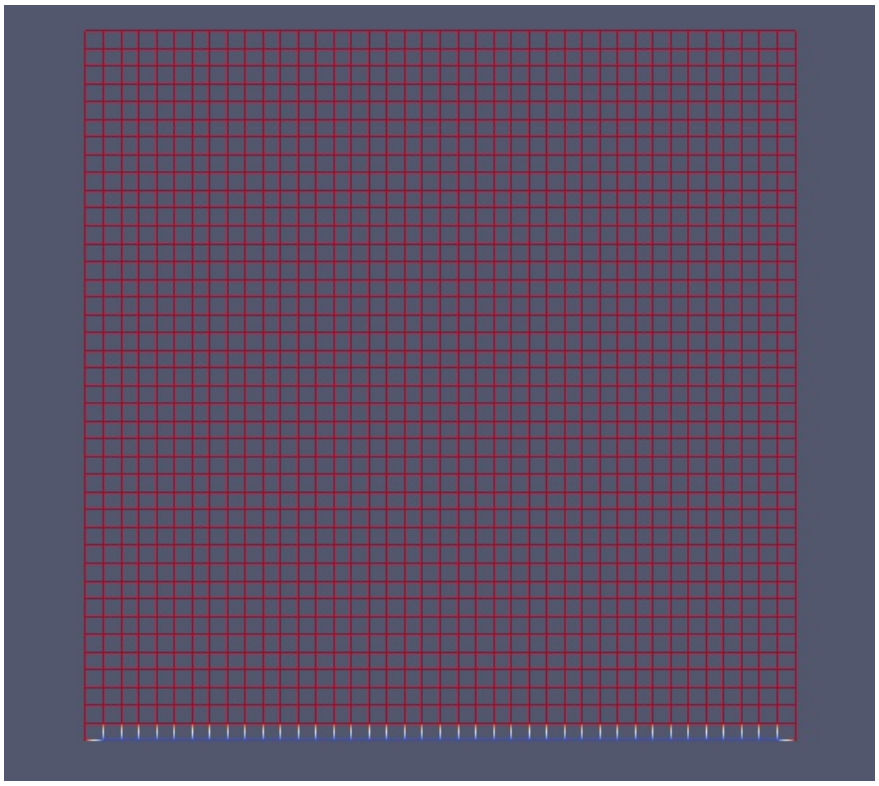
Computational Aerodynamics Questions & Answers

Question by Student 201227141

Professor, at assign#7 i just changed mf and xiverge then i got this wrong picture.



I can't understand what i did wrong.

There's not enough information provided for me to help you. You need to isolate the problem and indicate clearly what change in the control file created this problem.

Question by Student 201427142

Professor, I have problem with Q#2 at Ass. #7. You said $r = \sqrt{2}$*. However, when I set* $mf = 2\sqrt{2}$*, there is no (0, 0) point instead (*± 0.0175439*,*± 0.0175439*). You intend to reduce the scale, but I think it cannot be done. How can I to do about it?*

That's correct: I did this on purpose so you need to find a way to approximate $\delta_x P$ at the origin as well as possible when there is no node exactly at the origin. There are several ways this can be done. Explain clearly in your solutions how you do this. 2 points bonus.

Question by Student 201227147

In class, you defined ϵ_f^{rel} as following: $\epsilon_f^{rel} \equiv |\frac{(\delta_x\phi)_c - (\delta_x\phi)_f}{(\delta_x\phi)_f}|$. However, in the table you uploaded, it says that $\epsilon_f^{disc,rel} \equiv \frac{(\delta_x\phi)_f - (\delta_x\phi)_c}{(\delta_x\phi)_f}$. Which definition is right?

Good observation. It's better to use the definition in the tables. Make modifications to your class notes accordingly. 2 points bonus.

Question by Student 201527110

Professor, I have one question during finding order of accuracy P. In definition,

$$P = \frac{1}{ln(R)} * ln(\frac{(\delta_x P)_3 - (\delta_x P)_2}{(\delta_x P)_2 - (\delta_x P)_1})$$

, however what if the value in log function is negative? Is it okay to take absolute value for that sequence?

Well, if the value is within the second log is negative it means you're not within the asymptotic range of convergence.. 2 points bonus.

Question by Student 201527110

Professor, I have one question about the finding of GCI_c what we did at the lecture of today. I understand we can consider $|\frac{(\delta_x P)_f}{(\delta_x P)_c}|$ as '1' in an asymptotic range, but in case of mesh 4,5 in today's lecture, is it okay to consider $|\frac{(\delta_x P)_f}{(\delta_x P)_c}|$ as '1' as well? Or should I substitute each values of δ_x in that form? In other word, if I assume mesh 4 and 5 is also in an asymptotic range, that means I can consider $|\frac{(\delta_x P)_f}{(\delta_x P)_c}|$ as '1' as well?

The GCI_c parameter is only used to check if the solution is in the asymptotic range. To check if the solution is in the asymptotic range, yes, you need to set the $\delta_x P$s to zero. If you don't do this, then computing GCI_c is useless as it will be a good check of whether we're in the asymptotic range or not. 1 point bonus.

Question by Student 201427102

I wrote at terminal

./warp -r rarefaction.wrp -i out.01 -oi out.01i -q

But Terminal said

Data file has 20 grid lines along i but the control file specifies 40 grid lines.

How can I correct this problem?

Hm, this means that the file out.01 was created with a different mesh size than is now specified in your control file. I recommend not to use the interpolation file flags -oi or -ii if this gives you trouble (this saves on some computing time, but is a bit harder to operate). Simply create a new out.01 with the -o flag without reading in out.01i. That will work just as well but will be a bit slower.