AM40SD:Assessed Tutorials (Sheet 1) - 0%

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27 Nov 2012

Questions

These tutorial sheets will be marked with feedback, but **do not** carry any weighting towards the final mark. **Please show all working.**

Deadline: 3 Dec 2012 (6PM) MB312A.

1) Find in terms of permutation symbols,

- $(\nabla \times \vec{A})_i$
- $(\nabla \times (\nabla \times \vec{A}))_i$

[10 marks]

2) Given equation, $\frac{\partial \vec{u}}{\partial t} + ((\vec{u}.\nabla)\vec{u}) = \vec{u}$ and adding pertrubation $\tilde{u}$ to the basic flow denoted by $\vec{u}$, find out the linearlized equation, which takes into consideration this pertrubation.

[10 marks]

3) Consider variable, y which is measured in meters (m). Find the non-dimensionalized variable, y^*.

[3 marks]

4) Provide the definitions of $\boldsymbol{\epsilon}\cdot$ and $\boldsymbol{\delta}\cdot$

[2 marks]

5) Given the definition of operators, $\boldsymbol{\delta}\cdot$ and $\boldsymbol{\epsilon}\cdot$ in the tutorial notes, prove that,

$$\boldsymbol{\delta}\cdot\boldsymbol{\epsilon} = 0$$

Explain **every step** you do.

[20 marks]

6) Given that for pertrubations, $\tilde{u}$ are given by $\boldsymbol{\delta}\psi + \boldsymbol{\epsilon}\phi$, prove that $\nabla\cdot\tilde{u} = 0$. Show the complete proof.

[20 marks]

[Total: 65 marks]

We will go through these in the next tutorial slot (I tutor you for).