Algebra-Hundford

learning note For reading translation

我真的不懂忧郁

TUDelft

Algebra-Hundford

learning note For reading translation

by

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Preface

A preface...

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Delft, July 2024

Summary

A summary...

目录

Nomenclature

If a nomenclature is required, a simple template can be found below for convenience. Feel free to use, adapt or completely remove.

Abbreviations

Abbreviation	Definition
ISA	International Standard Atmosphere
...	

Symbols

Symbol	Definition	Unit
V	Velocity	[m/s]
...		
ρ	Density	[kg/m^3]
...		

Chapter 1

Cauchy Schwarz 不等式

1.1. 不等式表述

对 n 维欧几里得空间 $\mathbb{R}^n$，对于任意的 $a, b \in \mathbb{R}^n$，定义欧几里得空间上的内积:(a, b)，内积的定义和性质在泛函分析和线性代数里都有介绍这里就不再赘述。下面是 Cauchy Schwarz 不等式的表述形式

$$|(a,b)|^2 = (a,a)(b,b)$$

1.2. 证明

对于 $x, y \in \mathbb{R}^n$，任意取 $\lambda \in \mathbb{R}$，根据内积的性质 $(x, x) \geqslant 0$

$$(x + \lambda y, x + \lambda y) = (x, x) + \overline{\lambda}(x, y) + \lambda(y, x) + |\lambda|^2 (y, y) \geqslant 0 \tag{1.1}$$

其中 $\overline{\lambda}$ 表示 λ 的共轭，因为是实数域所以 $\overline{\lambda} = \lambda$。再由内积的对称性：$(x, y) = (y, x)$（本来是共轭对称，但是因为实数域），所以

$$\frac{(x, x)}{(y, y)} + 2\lambda \frac{(x, y)}{(y, y)} + |\lambda|^2 \geqslant 0 \tag{1.2}$$

Chapter 2

代数学每周一题

2.1. 问题 2014S01

> **Question 1:** 设 $f(x_1, x_2, \cdots, x_n)$ 是次数等于 2 的 n 元实系数多项式，S 是使得 $f(x_1, x_2, \cdots, x_n)$ 达到最大值或最小值的点的集合，若 $f(x_1, x_2, \cdots, x_n)$ 是关于未定元 $x_1, x_2, \cdots, x_n$ 的对称多项式并且 S 为有限非空集合，证明：存在 $b \in \mathbb{R}$，使得
>
> $$S = \{ (b, b, \cdots, b) \} \tag{2.1}$$

对称多项式： 假设一个多项式 $P(x_1, \cdots, x_n)$ 交换任意未定元后还是这个多项式本身，则称为对称多项式。

solution. 对称多项式可表述为

$$f(x_1, x_2, \cdots, x_n) = a \sum_{i=1}^{n} x_i^2 + 2c \sum_{1 \le i < j \le n} x_i x_j + d \sum_{i=1}^{n} x_i \tag{2.2}$$

根据函数极值的必要条件：函数极值存在则导数为 0。对 $f(x_1, x_2, \cdots, x_n)$ 求导得

$$\begin{cases} 2ax_1 + 2cx_2 + \cdots + 2cx_n = -d \\ 2cx_1 + 2ax_2 + \cdots + 2cx_n = -d \\ \quad\quad\quad \vdots \\ 2cx_1 + 2cx_2 + \cdots + 2ax_n = -d \end{cases} \tag{2.3}$$

□

References

[1] I. Surname, I. Surname, and I. Surname. "The Title of the Article". In: *The Title of the Journal* 1.2 (2000), pp. 123–456.

Chapter A

Source Code Example

Adding source code to your report/thesis is supported with the package listings. *An example can be found below. Files can be added using* \lstinputlisting[language=<language>]{<filename>}.

```python
"""
ISA Calculator: import the function, specify the height and it will return a
list in the following format: [Temperature,Density,Pressure,Speed of Sound].
Note that there is no check to see if the maximum altitude is reached.
"""

import math
g0 = 9.80665
R = 287.0
layer1 = [0, 288.15, 101325.0]
alt = [0,11000,20000,32000,47000,51000,71000,86000]
a = [-.0065,0,.0010,.0028,0,-.0028,-.0020]

def atmosphere(h):
    for i in range(0,len(alt)-1):
        if h >= alt[i]:
            layer0 = layer1[:]
            layer1[0] = min(h,alt[i+1])
            if a[i] != 0:
                layer1[1] = layer0[1] + a[i]*(layer1[0]-layer0[0])
                layer1[2] = layer0[2] * (layer1[1]/layer0[1])**(-g0/(a[i]*R))
            else:
                layer1[2] = layer0[2]*math.exp((-g0/(R*layer1[1]))*(layer1[0]-layer0[0]))
    return [layer1[1],layer1[2]/(R*layer1[1]),layer1[2],math.sqrt(1.4*R*layer1[1])]
```

Chapter B

Task Division Example

If a task division is required, a simple template can be found below for convenience. Feel free to use, adapt or completely remove.

表 **B.1:** Distribution of the workload

	Task	Student Name(s)
	Summary	
Chapter 1	Introduction	
Chapter 2		
Chapter 3		
Chapter *		
Chapter *	Conclusion	
	Editors	
	CAD and Figures	
	Document Design and Layout	