



The Analysis of Tidal Stream Power

JACK HARDISTY

The University of Hull, Kingston-upon-Hull, UK



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Contents

Preface	ix
Website contents	xi
Origin of online images	xiii
Copyright acknowledgements	xv
Symbols	xvii
Part I Theory	
1 History of tidal and turbine science	3
1.1 Introduction	3
Part 1 Tidal science	4
1.2 Antiquity: Aristotle and Ptolemy	4
1.3 Middle Ages: Copernicus to Galileo	7
1.4 Isaac Newton and the equilibrium theory	12
1.5 Measurement after Moray	15
1.6 Eighteenth and nineteenth centuries: Laplace to Kelvin	17
1.7 Tide-predicting machines	20
1.8 Tidal currents	22
Part 2 Turbine science	24
1.9 Antiquity: the Romans and Chinese	24
1.10 Middle Ages: the Syrians and Agricola	25
1.11 Eighteenth and nineteenth centuries: Smeaton to Kaplan	26
1.12 Modern turbines	29
1.13 Summary	30
1.14 Bibliography	30
2 Tidal hydraulics	33
2.1 Introduction	33
2.2 Elementary fluid flow	34
2.3 Hydraulic power	35
2.4 Turbulence and the Reynolds number	36
2.5 Critical flow and the Froude number	39
2.6 Bernoulli's equation	40
2.7 von Kármán's equation	42

2.8	Properties of the Airy wave	45
2.9	Tides in estuaries	46
2.10	Harmonic prediction of tidal currents	47
2.11	Turbulent characteristics of tidal currents	48
2.12	Redundancy and intermittency	50
2.13	Summary	52
2.14	Bibliography	54
3	Principles of tidal power devices	55
3.1	Introduction	55
3.2	Tidal wheels, mills, and barrages	57
3.3	Efficiency, capacity factor, and solidity ratio	58
3.4	Hydraulic processes, Part I: Tidal stream power	59
3.5	Hydraulic processes, Part II: Ducts and diffusers	61
3.6	Turbine processes, Part I: Drag and lift forces	64
3.7	Turbine processes, Part II: Shaft power	68
3.8	Electrical processes, Part I: Overview and generators	74
3.9	Electrical processes, Part II: Cabling and grid connection	76
3.10	Categories of turbines	78
3.11	Horizontal-axis devices	80
3.12	Vertical-axis devices (crossflow turbines)	81
3.13	Summary	85
3.14	Bibliography	87
4	Tidal power technologies	89
4.1	Introduction	89
4.2	Blue Energy	91
4.3	Clean Current	92
4.4	Engineering Business	93
4.5	Gorlov helical turbine	94
4.6	Hammerfest Strøm	95
4.7	Lunar Energy	96
4.8	Marine Current Turbines	98
4.9	Neptune Renewable Energy	99
4.10	OpenHydro	102
4.11	Ponte di Archimede (Kobold)	103
4.12	Pulse Generation	104
4.13	SeaPower	105
4.14	SMD Hydrovision	107
4.15	Underwater electric kite	108
4.16	Verdant Power	109
4.17	Other proposals	111
4.18	Early-stage proposals	117
4.19	Bibliography	118
5	Modelling tidal stream power	121
5.1	Introduction	121
5.2	Global tidal streams	122
5.3	Tidal datum and tidal heights	124
5.4	British Admiralty tidal diamonds	127
5.5	Harmonic decomposition	129

5.6	STEM display screen	137
5.7	Running STEM	142
5.8	Case study at Flat Holm in the Bristol Channel	142
5.9	Case study at Hull St Andrews in the Humber Estuary	144
5.10	Summary	146
5.11	Bibliography	149

Part II Practice

6	Economics and finance	153
6.1	Introduction	153
6.2	The Renewable Energy Business	155
6.3	Costs	157
6.4	Revenue	161
6.5	Economic result	166
6.6	Conclusions	168
6.7	Bibliography	170
7	North-west Europe	171
7.1	Introduction	171
7.2	Geography of north-west Europe	173
7.3	Oceanography of north-west Europe	176
7.4	Mediterranean	181
7.5	Spain and Portugal	182
7.6	France	183
7.7	Belgium, the Netherlands, and Germany	186
7.8	Denmark and Norway	186
7.9	United Kingdom	187
7.10	The estuaries	195
7.11	Bibliography	197
7.12	Appendix: STEM outputs for north-west Europe	199
8	North America	203
8.1	Introduction	203
8.2	Geography of North America	206
8.3	Oceanography of North America	210
8.4	East coast of Canada	214
8.5	East coast of the United States	217
8.6	West coast of Canada	218
8.7	West coast of the United States	219
8.8	Bibliography	225
8.9	Appendix	228
9	Australia and New Zealand	233
9.1	Introduction	233
9.2	Timor Sea	236
9.3	Arafura Sea	238
9.4	Coral Sea	240
9.5	Bass Strait	242
9.6	New Zealand	243

9.7	Bibliography	246
9.8	Appendix: STEM outputs for Australia and New Zealand	248
10	Rest of the world	249
10.1	Introduction	249
10.2	Barents Sea	251
10.3	Western South Atlantic	254
10.4	Western Indian Ocean	258
10.5	East Arabian Sea	259
10.6	Indonesia and the Java Sea	262
10.7	East China and Yellow Seas	264
10.8	Bibliography	266
10.9	Appendix	268
	Glossary	269
	Index	311

Preface

I have been engaged in marine environmental research throughout my career, but came latterly to the subject of Renewable Energy. My first contact involved an analysis of the potential for tidal power around the United Kingdom. This appeared straightforward, and 18 sites were identified (most of which are detailed now in Chapter 7) from British Admiralty tidal diamonds, and their hydraulic powers were calculated. The draft report, however, missed the Pentland Firth because there are no tidal diamonds in this very high-current regime. Therefore, when the *DTI Tidal Resource Atlas* was published a few weeks later, it was apparent that the methodology was correct (basic physics) but the results were not. There was much more to this renewable energy business than initially met the eye, and I became addicted. A whole new world of fascinating research problems opened up as we worked for some of the major players such as Lunar Energy, ITPower, Pulse Generation, and Neptune. I strove to maintain academic rigour and peer review in a fast-moving field with a harshly commercial environment. The result is this book, which attempts to set down, for the first time, the fundamental physics behind tidal stream power alongside a global analysis of its distribution and potential.

I have been very fortunate to work with some of the best British practitioners. Thanks are due to Simon Meade at Lunar Energy, Jamie O’Nians and Huw Traylor from IT Power, Pete Stratford (then) from BMT Renewables, Marc Paish from Pulse Generation, Glenn Aitken, Andrew Laver, and Nigel Petrie at Neptune Renewable Energy, and Nathalie Stephenson from Atkins Global. I have also engaged with many industrial and business people including Graham Bilaney, formerly at Dunstons, Stuart Reasbeck at IMT Marine, Ian Mitchell at Ormston, MMS Shiprepairers, David Brown Gearboxes, and the electrical engineers at Sprint and Brook Compton. Much has been learnt from these specialists.

Thanks are also due to many academic colleagues, and to the students who quickly and willingly took up undergraduate and graduate dissertations in Renewable Energy. There is a growing group in Hull University who have taken Research Masters and Doctoral programmes on some of the problems detailed in these pages, including Emma Toulson and the MRes students Tom Smith, Chris Smith, and Paul Jensen. It is an old aphorism, but no less valid that: teaching remains the best way of learning. The colleagues with whom I have discussed much, and among whom we have developed our University’s Renewable Energy centre of excellence, include Stuart McLelland, Brendan Murphy, David Calvert, and Professors Lynne Frostick, Tom Coulthard, and Mike Elliott. John Garner drew many of the diagrams herein.

In addition, and for completely different reasons, much of this book was written on the Haemodialysis Unit at Hull Royal Infirmary, and my thanks are due to my

consultant, David Eadington, and to the ward staff, particularly Sue Smith and Rita Soames. Writing was initially interrupted and later enhanced by very useful stays in the excellent Renal Transplant Unit at St James' Hospital; thanks are due to the staff there and in, particular, to Mr Ahmed and the team on Ward 59.

Finally, there is my indulgent family; I gratefully acknowledge the help and support of Paul, Tor, Lexie, Lizzie, Annette, and, in particular, my son James for always being there. Last, but by no means least, this book is for Sarah.

*Jack Hardisty
East Yorkshire
July 2008*

Website contents

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1 The simplified tidal economic model (STEM)

STEM Europe

STEM North America

STEM Australia and New Zealand

STEM Rest of the World

STEM Template

2 Figures and ancillary models

Figure 1.11 Newton's equilibrium tide.

Figure 2.08 von Karman's equation.

Figure 2.09 van Veen's equation.

Figure 2.11 Airy wave.

Figure 3.01 Tidal stream power.

Figure 3.06 Generalized duct power.

Figure 3.12 Turbine shaft power.

Figure 3.14 Horizontal-axis shaft power.

Figure 3.16 Vertical-axis shaft power.

Figure 5.06 Tidal regressions.

Table 2.04 Tidal species and periods.

Table 4.01 Tidal stream power devices.

Table 8.07 SE Canada flow computation.

Table 8.09 San Francisco tides.

3 Bibliographies and references

4 Original links to selected figures

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- 1.1 <http://en.wikipedia.org/wiki/Aristotle>
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- 1.22 <http://www.uh.edu/engines/epi2194.htm>
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- 1.26 <http://www.kekenergia.hu/viz/kaplanfoto.jpg>
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- 2.3 <http://en.wikipedia.org/wiki/Image:Oreynolds.jpg>
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- 2.11 <http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Airy.html>
- 3.3 http://en.wikipedia.org/wiki/Tide_mill
- 3.4 Left: <http://www.lunarenergy.co.uk>
Right: <http://www.cleancurrent.com>
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- 3.11 <http://www.search.com/reference/Airfoil>
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