

Contents

Preface	ix
1 Historical Introduction	1
References	11
2 Some Relevant Basic Physics	12
2.1 Metastable phases of a liquid	12
2.2 Cavitation nuclei	15
2.3 The Rayleigh cavity	19
2.4 Pressure reduction in a throat. Cavitation number	21
References	22
3 Static Application of Tension to a Liquid	24
3.1 The Berthelot tube method	24
3.2 Electrical modifications of the Berthelot tube experiment	25
3.3 The use of a spiral Berthelot tube	29
3.4 Theoretical aspects of the Berthelot tube method	31
3.5 Hayward's work on the double metastable state of water	34
3.6 The centrifugal method	36
3.7 Discussion	38
References	38
4 Dynamic Stressing of a Liquid	40
4.1 Methods based on the reflection principle	40
4.2 Direct methods of generating a tension pulse	52
4.3 The use of a water shock tube	55
4.4 Discussion	58
References	58
5 Bubble Studies	60
5.1 Introduction	60
5.2 Ultrasonic work	61

5.3	Laser work	64
5.4	Water shock tube experiments	67
5.5	Spark-gap methods	70
5.6	Mathematical theory of bubble dynamics	74
5.7	Cavity clusters	78
5.8	The growth–collapse behaviour of cavities	79
5.9	Discussion	80
	References	81
6	Cavitation Erosion	83
6.1	Introduction	83
6.2	Vibratory cavitation erosion techniques	84
6.3	Erosion testing with a cavitating jet	88
6.4	Water tunnel experiments	92
6.5	Experiments with spark-induced bubbles	95
6.6	Cavitation damage in large concrete structures	96
6.7	Discussion	99
	References	100
7	Miscellaneous Related Topics	101
7.1	Tensile strength experiments using a ‘host’ liquid as container	101
7.2	Tribonucleation	103
7.3	Cavitation in bearings	104
7.4	Cavitation in medicine	107
7.5	The ascent of sap in trees	110
7.6	The effect of polymeric additives on cavitation	111
	References	112
8	Survey of the Present Position	114
	<i>by Professor H N V Temperley</i>	
8.1	Topics considered	114
8.2	Theoretical tensile strength	116
8.3	How far does experiment confirm theory?	118
8.4	The behaviour of cavitated liquid	121
	References	122
	Index	123