

# List of Figures

1.1	Types of fluid . . . . .	3
1.2	Application of MHD . . . . .	5
2.1	Physical sketch . . . . .	30
2.2	$\hbar$ -curve for $f''(0)$ , $\theta'(0)$ . . . . .	35
2.3	$f'(\eta)$ via $M$ . . . . .	36
2.4	$f'(\eta)$ via $f_w$ . . . . .	37
2.5	$f'(\eta)$ via $\gamma$ . . . . .	37
2.6	$f'(\eta)$ via $Gr_T$ . . . . .	38
2.7	$\theta(\eta)$ via $Br$ . . . . .	38
2.8	$\theta(\eta)$ via $M$ . . . . .	39
2.9	$\theta(\eta)$ via $Pr$ . . . . .	39
2.10	$\theta(\eta)$ via $Rd$ . . . . .	40
2.11	$\mathcal{N}_G$ via $Br$ . . . . .	40
2.12	$Be$ via $Br$ . . . . .	41
2.13	$\mathcal{N}_G$ via $M$ . . . . .	41
2.14	$Be$ via $M$ . . . . .	42
2.15	$\mathcal{N}_G$ via $\alpha_1$ . . . . .	42
2.16	$Be$ via $\alpha_1$ . . . . .	43
2.17	$C_{fx}Re_x^{1/2}$ via $M$ . . . . .	44
2.18	$C_{fx}Re_x^{1/2}$ via $\gamma$ . . . . .	45
2.19	$Nu_xRe_x^{-1/2}$ via $Br$ . . . . .	45
3.1	Physical sketch . . . . .	51
3.2	$\hbar$ -curve for $f''(0)$ . . . . .	56
3.3	$\hbar$ -curve for $\theta'(0)$ . . . . .	57
3.4	$\hbar$ -curve for $\theta'(0)$ . . . . .	57
3.5	$f'(\eta)$ via $M$ . . . . .	58
3.6	$f'(\eta)$ via $\gamma$ . . . . .	58
3.7	$f'(\eta)$ via $f_w$ . . . . .	59

3.8	$\theta(\eta)$ via $Rd$	59
3.9	$\theta(\eta)$ via $\theta_w$	60
3.10	$\theta(\eta)$ via $Br$	60
3.11	$\theta(\eta)$ via $Pr$	61
3.12	$\phi$ via $Sc$	61
3.13	$\phi$ via $f_w$	62
3.14	$N_G$ via $L^*$	62
3.15	$Be$ via $L^*$	63
3.16	$N_G$ via $M$	63
3.17	$Be$ via $M$	64
3.18	$N_G$ via $Br$	64
3.19	$Be$ via $Br$	65
4.1	Physical problem	71
4.2	$\hbar$ -curve for $f''(0)$	75
4.3	$\hbar$ -curve for $\theta'(0)$	75
4.4	$\hbar$ -curve for $\phi'(0)$	76
4.5	$f'(\eta)$ via $We$	79
4.6	$f'(\eta)$ via $\zeta$	79
4.7	$f'(\eta)$ via $M$	80
4.8	$f'(\eta)$ via $Gr_T$	80
4.9	$f'(\eta)$ via $Gr_C$	81
4.10	$\theta(\eta)$ via $M$	81
4.11	$\theta(\eta)$ via $Rd$	82
4.12	$\theta(\eta)$ via $\theta_w$	82
4.13	$\theta(\eta)$ via $Pr$	83
4.14	$\theta(\eta)$ via $\beta$	83
4.15	$\theta(\eta)$ via $Du$	84
4.16	$\phi(\eta)$ via $Sc$	84
4.17	$\phi(\eta)$ via $Sr$	85
5.1	$\hbar$ -curve for range $f'', \theta'$ and $\phi'$	98
5.2	$f'$ via $\zeta$	100
5.3	$f'$ via $M$	101
5.4	$f'$ via $m$	102
5.5	$f'$ via $p_i$	102
5.6	$f'$ via $f_w$	103
5.7	$f'$ via $We$	103

5.8	$\theta$ via $M$	104
5.9	$\theta$ via $m$	104
5.10	$\theta$ via $Rd$	105
5.11	$\theta$ via $\theta_w$	105
5.12	$\theta$ via $Du$	106
5.13	$\phi$ via $Sc$	106
5.14	$\phi$ via $Sr$	107
5.15	Friction factor for $f_w$ in 2-dimension shrinking case	107
5.16	Friction factor for $f_w$ in 3-dimension shrinking case	108
5.17	Friction factor for $f_w$ in 2-dimension stretching case	108
5.18	Friction factor for $f_w$ in 3-dimension stretching case	109
5.19	Nusselt count for $Rd$ and $\theta_w$	109
5.20	Nusselt count for $Rd$ and $\theta_w$	110
5.21	Sherwood count for $Sc$ and $Sr$	110
5.22	Sherwood count for $Sc$ and $Sr$	111
6.1	$f''(0)$ via $\hbar_f$	123
6.2	$h'(0)$ via $\hbar_h$	123
6.3	$\theta'(0)$ via $\hbar_\theta$	124
6.4	$\phi'(0)$ via $\hbar_\phi$	124
6.5	$f'(\eta)$ via $M$	125
6.6	$f'(\eta)$ via $K$	125
6.7	$f'(\eta)$ via $Ec$	126
6.8	$f'(\eta)$ via $A$	126
6.9	$h(\eta)$ via $A$	127
6.10	$h(\eta)$ via $\lambda_4$	127
6.11	$h(\eta)$ via $Gr_T$	128
6.12	$h(\eta)$ via $K$	128
6.13	$\theta(\eta)$ via $M$	129
6.14	$\theta(\eta)$ via $K$	129
6.15	$\theta(\eta)$ via $Rd$	130
6.16	$\theta(\eta)$ via $\theta_w$	130
6.17	$\phi(\eta)$ via $A$	131
6.18	$\phi(\eta)$ via $M$	131
6.19	$\phi(\eta)$ via $Sc$	132
6.20	$\phi(\eta)$ via $Gr_T$	132
6.21	$C_{fx}$ via $A$	133
6.22	$M_{wx}$ via $A$	133

6.23	$Nu_x$ via $Pr$	134
6.24	$Sh_x$ via $A$	134
7.1	Physical Sketch of the Problem	139
7.2	$f''(0)$ for $\hbar_f$	146
7.3	$f'(\eta)$ for $M$	150
7.4	$f'(\eta)$ for $We$	150
7.5	$f'(\eta)$ for $A$	151
7.6	$f'(\eta)$ for $f_w$	151
7.7	$\theta(\eta)$ for $M$	152
7.8	$\theta(\eta)$ for $Rd$	152
7.9	$\theta(\eta)$ for $\theta_w$	153
7.10	$\theta(\eta)$ for $Ec$	153
7.11	$\theta(\eta)$ for $Pr$	154
7.12	$\theta(\eta)$ for $A$	154
7.13	$\phi(\eta)$ for $Kc$	155
7.14	$\phi(\eta)$ for $Sc$	155
7.15	$\phi(\eta)$ for $A$	156
7.16	$Be$ for $L^*$	156
7.17	$N_G$ for $L^*$	157
7.18	$N_G$ for $M$	157
7.19	$N_G$ for $Br$	158
7.20	$Be$ for $M$	158
7.21	$Be$ for $Br$	159
7.22	$C_{fx}Re_x^{1/2}$ for $We$	159
7.23	$C_{fx}Re_x^{1/2}$ for $Gr_C$	160
7.24	$Nu_xRe_x^{-1/2}$ for $\theta_w$	160
7.25	$Sh_xRe_x^{-1/2}$ for $Kc$	162
8.1	Physical Sketch of the Problem	166
8.2	$f''(0)$ via $\hbar_f$	172
8.3	$f'(\eta)$ via $f_w$	174
8.4	$f'(\eta)$ when $E = 0$ via $M$	174
8.5	$f'(\eta)$ when $E = 0.5$ via $M$	175
8.6	$f'(\eta)$ via $n$	175
8.7	$f'(\eta)$ via $\gamma$	176
8.8	$f'(\eta)$ via $E$	176
8.9	$f'(\eta)$ via $K$	177

8.10	$h(\eta)$ via $K.$	177
8.11	$h(\eta)$ via $n.$	178
8.12	$\theta(\eta)$ via $M.$	178
8.13	$\theta(\eta)$ via $\theta_w.$	179
8.14	$\theta(\eta)$ via $Rd.$	179
8.15	$\theta(\eta)$ via $E.$	180
8.16	$\theta(\eta)$ via $\lambda_1.$	180
8.17	$\phi(\eta)$ via $Sc.$	181
8.18	$\phi(\eta)$ via $\lambda_2.$	181
8.19	$C_{fx}Re_x^{1/2}$ via $M.$	182
8.20	$M_{wx}Re_x$ via $K.$	182
8.21	$Nu_xRe_x^{1/2}$ via $\theta_w.$	183
8.22	$Nu_xRe_x^{1/2}$ via $\theta_w.$	183
8.23	$Sh_xRe_x^{1/2}$ via $Sc.$	184