

Table of contents

<i>a. Abstract</i>	<i>i-iii</i>
<i>b. Declaration</i>	<i>iv</i>
<i>c. Certificate</i>	<i>v</i>
<i>d. Acknowledgements</i>	<i>vi-vii</i>
<i>e. Table of contents</i>	<i>viii-xi</i>
<i>f. List of tables</i>	<i>xii</i>
<i>g. List of figures</i>	<i>xiii-xxv</i>
<i>h. List of abbreviations</i>	<i>xxvi</i>
<i>i. List of symbols and significances</i>	<i>xxvii-xxviii</i>
<i>j. Academic program presentation</i>	<i>xxix</i>
<i>k. List of research publications</i>	<i>xxx</i>

Chapter-1 [1-13]

A brief overview of fluids existent on diverse scales

<i>Abstract</i>	1
1.1 Introduction	1-3
1.2 The fluid with ionized components: plasma	3
1.3 Fluids in the Universe	3-4
1.4 Existence of the plasma fluid	4-6
1.4.1 Plasma sheath formation mechanism	6
1.4.2 The Bohm sheath criterion	6
1.5 Structure formation in astrophysical plasma fluids	7-8
1.5.1 Jeans instability	7
1.5.2 Sheath formation in astrophysical plasmas	8
1.6 The solar (stellar) plasma structure	8-12
1.6.1 Standard solar model (SSM)	9-10
1.6.2 Gravito-electrostatic sheath (GES) model of the Sun	10-11
1.6.3 Polytropic solar plasma fluid	11-12
1.6.4 Non-thermal space plasma	12
<i>References</i>	12-13

Chapter-2 [14-43]

Equilibrium solar plasma properties in the polytropic turbomagnetic GES-model fabric

<i>Abstract</i>	14
2.1 Introduction	14-17
2.2 Solar plasma model formulation	17-23
2.2.1 SIP governing equations	18-22
2.2.2 SWP governing equations	22-23
2.3 Results and discussions	23-39
2.3.1 SIP characterization	25-31
2.3.2 SWP characterization	31-39
2.3.3 Comparative valuation	39
2.4 Conclusions	40
<i>References</i>	40-43

Chapter-3 [44-61]

Solar plasma characterization with inhomogeneity scale analysis in turbomagnetic GES-fabric

<i>Abstract</i>	44
3.1 Introduction	44-45
3.2 Solar plasma model formulation	45-47
3.2.1 Normalized SIP governing equations	46-47
3.2.2 Normalized SWP governing equations	47
3.3 Results and discussions	48-60
3.3.1 Inhomogeneity scale length behaviours of the SIP-properties	48-54
3.3.2 Inhomogeneity scale length behaviours of the SWP-properties	54-60
3.4 Conclusions	60-61
<i>References</i>	61

Chapter-4 [62-71]

Self-structurization of solar interior plasma in refined GES-model framework

<i>Abstract</i>	62
4.1 Introduction	62

4.2 Physical model formulation	62-64
4.3 Results and discussions	64-69
4.4 Conclusions	70
<i>References</i>	70-71

Chapter-5 [72-113]

Equilibrium solar plasma characterization in refined GES-model fabric with negative ions

<i>Abstract</i>	72
5.1 Introduction	72-73
5.2 Solar plasma model formulation	73-82
5.2.1 SIP formalism	74-80
5.2.2 SWP formalism	80-82
5.3 Results and discussions	82-110
5.3.1 SIP-illustration	84-104
5.3.2 SWP-illustration	104-109
5.3.3 Comparative valuation	109-110
5.4 Conclusions	111
<i>References</i>	112-113

Chapter-6 [114-129]

Self-organization of bounded solar plasma with negative ions in gravito-electrostatic phase space

<i>Abstract</i>	114
6.1 Introduction	114-115
6.2 Physical model formulation	115-116
6.3 Results and discussions	116-128
6.4 Conclusions	128
<i>References</i>	129

Chapter-7 [130-136]

Thesis summary and future scope

7.1 Concluding remarks	130-132
7.2 Future directions	132-134

References 134-136

APPENDIX-A [137-141]

Non-thermal GES-Bohm sheath criterion

APPENDIX-B [142-146]

Thermal GES-Bohm sheath criterion with negative ions