

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. Acknowledgement</i>	<i>vi</i>
<i>e. Table of contents</i>	<i>vii-ix</i>
<i>f. List of tables</i>	<i>x</i>
<i>g. List of figures</i>	<i>xi-xv</i>
<i>h. Academic programs participated</i>	<i>xvi</i>
<i>i. List of research publications</i>	<i>xvii</i>

CHAPTER-1 **[1-14]**

A BRIEF OVERVIEW OF PLASMA FIREBALL INSTABILITIES

<i>Abstract</i>	1
1.1 Plasma media	1-4
1.2 Plasma fireball	4-7
1.2.1 Classification of laboratory fireballs	5-7
1.2.2 Instabilities excitable in plasma fireballs	7
1.3 Motivation and objective	8-9
1.4 Methodology	9-12
1.5 Concluding remarks	12
<i>References</i>	12-14

CHAPTER-2 **[15-42]**

SHEATH PLASMA RESONANCE IN INVERTED FIREBALLS

<i>Abstract</i>	15
2.1 Introduction	15-16
2.2 Model equations	16-18
2.3 Stability analysis	18-23
2.4 Results and discussions	23-35
2.5 Conclusions	35-38
Appendix 2(A)	

Linear and quasilinear features	
(a) Condition for linear SPR structure	38-40
(b) Condition for quasilinear SPR structure	40
<i>References</i>	41-42
CHAPTER-3	[43-55]
QUASILINEAR ANALYSIS OF REGULAR PLASMA FIREBALL SHEATH INSTABILITY	
<i>Abstract</i>	43
3.1 Introduction	43-44
3.2 Physical model and formalism	44-50
3.3 Results and discussions	50-52
3.4 Conclusions	52-53
<i>References</i>	53-55
CHAPTER-4	[56-85]
QUASILINEAR SHEATH PLASMA INSTABILITY ANALYSIS IN INVERTED FIREBALLS	
<i>Abstract</i>	56
4.1 Introduction	56-59
4.2 Physical model and formalism	59-68
4.3 Results and discussions	68-76
4.4 Conclusions	76-82
<i>References</i>	83-85
CHAPTER-5	[86-111]
NONLINEAR ANALYSIS OF REGULAR PLASMA FIREBALL SHEATH INSTABILITY	
<i>Abstract</i>	86
5.1 Introduction	86-87
5.2 Physical model and analytic formalism	87-105
5.2.1 First-order perturbed parameters	90-91
5.2.2 Second-order perturbed parameters	91-94
5.2.3 Third-order perturbed parameters	94-99

5.2.4 Fourth-order perturbed parameters	99-104
5.3 Results and discussions	105-109
5.4 Conclusions	109-110
<i>References</i>	110-111
CHAPTER-6	[112-116]
CONCLUSIONS AND FUTURE PROSPECTS	
<i>Abstract</i>	112
6.1 Concluding remarks	112-114
6.2 Future prospects	114-115
<i>References</i>	115-116