ACKNOWLEDGEMENTS

First and foremost, I wish to sincerely to Professor S. C. Sharma, for accepting me as a student, persevering with my work and providing me all the support that a student needs to perform good research. I thank him for his constant encouragement and valuable guidance. I would also like to extend my deep sense of appreciation to my branch coordinator Dr. Nitin K. Puri for his valuable support

I wish to sincerely thank the PhD students. Ms. Jyotsna Panwar and Ms. Neha Gupta for their constant support and encouragement, for patiently listening to the never-ending review presentations, and for providing me with their invaluable suggestions and feedback. My special thanks to Mr. Gaurav Kumar, Mr. Mrityunjay Singh and Mr. Gyan Prakash Singh for all the passionate discussions we had on the subject and introducing me to this work. I would like to thank all of them for making me feel at ease in the new environment at Physics Department from day one.

Last, and most importantly, this research would not have been possible but for the sacrifice of my family. The constant emotional support of all my relatives, colleagues and friends during my stay at hostel has been indispensable to this research.

ABSTRACT

I, have developed a model on Role of Dust Grains in parametric coupling of a lower hybrid pump wave with neutral beam driven ion-cyclotron instability in a tokomak. I, have found that the growth rate of mode increases with the relative density of dust grains δ and dust grain density n_{d0r}.It has also been observed that the growth rate increases with reducing the dust grain size a.

TABLE OF CONTENTS

LIST OF FIGURE

NOTATIONS

-e	=	electron charge
m	=	mass of electrons
m_i	=	mass of ion
m_d	=	mass of dust
ϕ_0	=	electrostatic potential of lower hybrid pump wave
ϕ	=	parametric couple to an ion cyclotron mode with potential
ϕ_2	=	electrostatic potential of upper side band mode
ϕ_{pr}	=	pondermotive potential
E	=	normalized electric field
ω_0	=	angular frequency of lower hybrid pump wave
ω	=	angular frequency of parametric couple to an ion cyclotron mode
ω_1	=	angular frequency of lower sideband mode
ω_2	=	angular frequency of upper sideband mode
ω_{cr}	=	electron cyclotron frequency
ω_{cir}	=	ion cyclotron frequency
ω_{pr}	=	electron phase frequency
ω_{pir}	=	ion phase frequency
ω_{dr}	=	dust phase frequency
n_{er}	=	electron density distribution
n_{ir}	=	ion density distribution
n_{br}	=	beam density distribution
n_0	=	plasma density
c	=	speed of light
ε_0	=	free space permittivity
ε	=	parametric couple mode permittivity in presence of dust

ε_2 = upper sideband mode permittivity

X_{er} = electron susceptibility

X_{ir} = ion susceptibility

X_{br} = beam susceptibility

X_{dr} = dust susceptibility

V_{ther} = thermal velocity of electrons

V_{thir} = thermal velocity of ion

C_{sr} = thermal velocity of speed of light

F_{pz} = pondermotive force

μ_r = coupling coefficient

δ = relative density of dust grains