Classification of instability modes in a model of aluminium reduction cells with a uniform magnetic field

by

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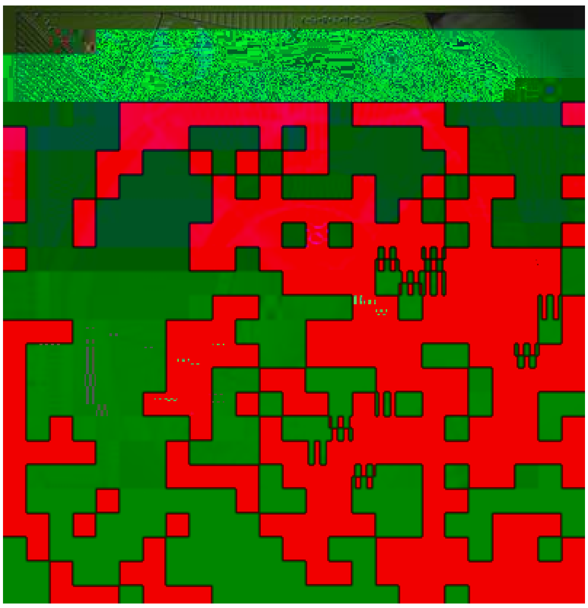
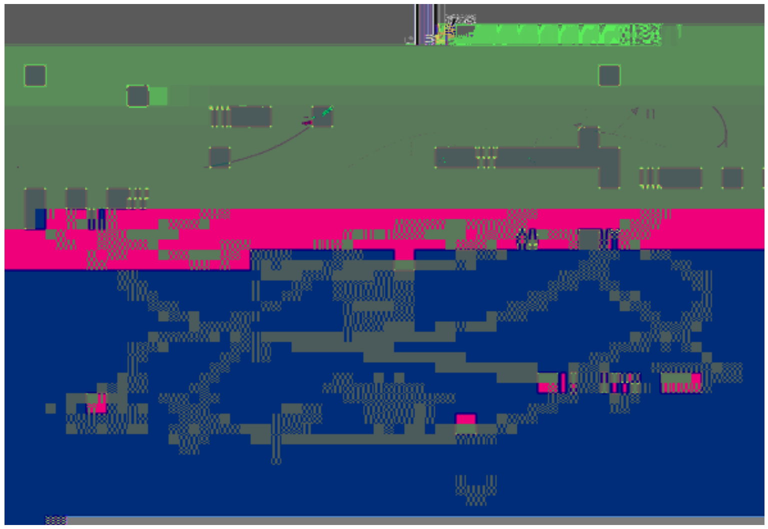


1. Introduction

I



x y

j B L H H g

j

B

L H

3. Half-plane

x

x

$$\overline{}\ x \qquad \overline{}\ x \qquad \overline{}\ y \qquad x$$

$$x \quad ik_y y \quad i \quad t \qquad x \quad ik_y y \quad i \quad t$$

k_y

$$\frac{d}{dx} \quad k_x \qquad \frac{d}{dx} \quad k_y$$

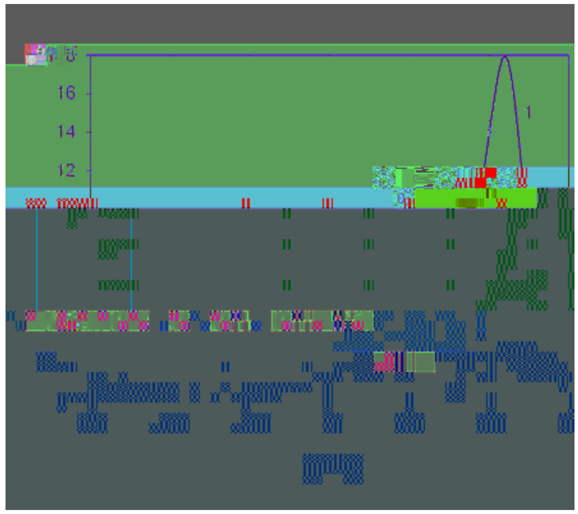
$$\frac{d}{dx} \qquad \frac{d}{dx} \quad i \; k_y \qquad x$$

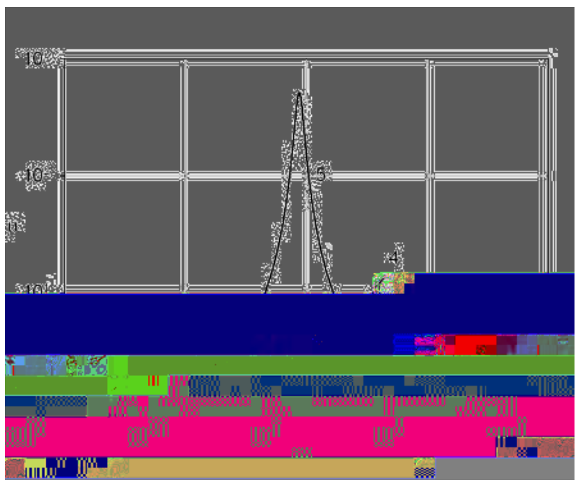
$$k_x \qquad k_y$$

$$i\frac{k_x}{k_y}\,C \quad C \quad e^{k_y x} \quad — C\,e^{ik_x x} \quad C\,e^{\;ik_x x}$$

$$C \qquad - \qquad \frac{k_y}{k_x \qquad\quad i}$$

$k_y \;\; k_x$





O

i

i

$$\sqrt{\quad\sqrt{\quad}} \qquad \sqrt{\quad\sqrt{\quad}}$$

k_y

k_y $_r$ i $_i$

$_r$ $\sqrt{A\ \sqrt{A}}$ $_i$ $_r$ A

$_r$

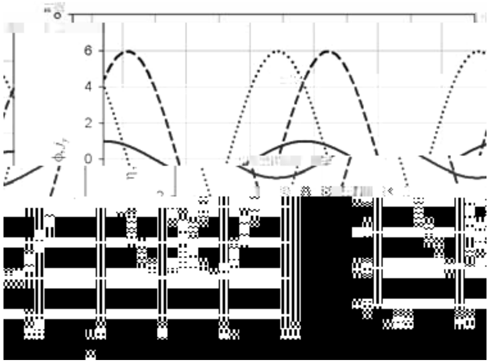
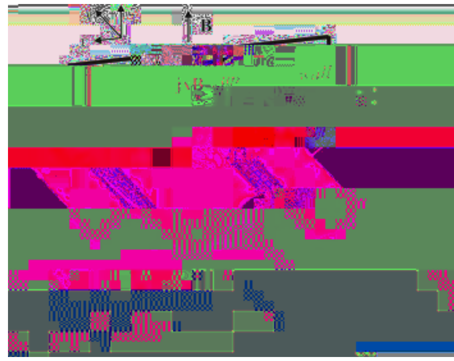
y y

y

E

$\overline{\quad t \quad}$ $\overline{\quad x \quad}$

k_y

 a)  b)

j_y x t k_y

core

global

4. Circular domain

r *in* i t r *in* i t

k_r r CJ_n $k_r r$ r k_r r n r^n

J_n n ,12jEgiv:s:ZBTD2(44565 . 0 6.5925 205.5 4266986 T14.86

n $k_r^{n\,l}$ l

k_r k_r

k_r

k_r

n l

l l $k_r^{n\,l}$

l

$$k_r \quad \sqrt{\ i} \quad \sqrt{-} \quad i$$

$$_L \quad \sqrt{\ i}$$

x y

x y

4.2 Centre, or Sele modes

5. Infinite channel

$$— C e^{ik_x x} \quad C e^{\;ik_x x} \quad C e^{k_y x} \quad C e^{\;k_y x}$$

k_x k_y C C

k_x

q p q q p p p q q p

5.1 Wall modes

k_x

k_y $_{cr}$ $_{cr}$

k_x

x x

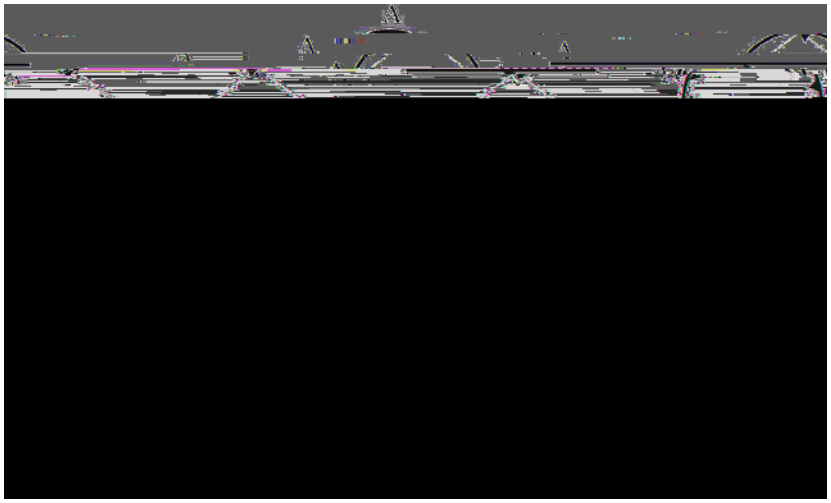
$L1$ L

C *i*

x

$$\frac{k_y}{k_y} \qquad \frac{k_y}{k_y}$$

6. Reflection mechanism



6.2 Applications of the reflection theory

k_x

O

References