CONTENTS

LIST OF TABLES

LIST OF FIGURES

NOMENCLATURE

D_j	Jet diameter at the injection pipe exit (mm)
f	Oscillation frequency of time periodic flow (Hz)
F	Non-dimensional oscillation frequency, $f/(\alpha/H^2)$
g	Gravitational acceleration (mm/s^2)
Gr	Grashof number, $g\beta\Delta TH^3/\nu^2$
Gr/Re_j^2	Critical buoyancy-to-inertia ratio for the onset of buoyancy induced roll
H	Distance between the exit of injection pipe and heated plate (mm)
Q_j	Jet flow rate (Standard Liter per Minute, slpm)
r_s	The center of the location of secondary inertia-driven roll (mm)
r, θ, z	Dimensional cylindrical coordinates
R, Θ, Z	Dimensionless cylindrical coordinates, $r/R_c, \theta, z/H$
Ra	Rayleigh number, $g\beta\Delta TH^3/\alpha\nu$
R_c	Radius of processing chamber (mm)
Re_j	Jet Reynolds number, $\overline{V_j}D_j/\nu$
Re_w	Local Reynolds number in the wall-jet region, $\bar{u}H/\nu$
Re_{we}	Local Reynolds number in the wall-jet region at the edge of heated disk
S_I	Size of primary inertia-driven roll (mm)
S_O	Size of buoyancy-driven roll (mm)
T_f	Temperature of the heated disk (℃)
T_j	Temperature of jet at the injection pipe exit (℃)
t	Time (sec)
$\bar{u}$	Average velocity of the flow at wall-jet region (mm/s), $(Re_j D_j \nu)/(8rH)$
$\overline{V}_j$	Average velocity of the air jet at the injection pipe exit (mm/s)

Greek symbols

α	Thermal diffusivity (mm^2/s)
β	Thermal expansion coefficient (1/K)
ΔT	Temperature difference between the heated disk and the injected air (℃)
ν	Kinematic viscosity (mm^2/s)
Φ	Non-dimensional temperature, $\left(T - T_j\right)/\left(\overline{T}_f - T_j\right)$

Superscript

—	Average

Subscripts

c	Processing chamber
e	Edge of heated disk
f	Fluid, Air
j	Jet impinging
I	Primary inertia-driven roll
O	Buoyancy-driven roll
s	Secondary inertia-driven roll
w	Wall-jet region