TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

NOMENCLATURE

A : area or interfacial area density (m2)

C_D : drag coefficient (-)

D : inner pipe diameter (m)

D^* : dimensionless number of pipe inner diameter (-)

D_b : bubble diameter (m)

D_d : droplet diameter (m)

D_H : hydraulic diameter (m)

f_i : interfacial friction factors (-)

f_{wk} : phase-wall friction factors (-)

g : gravitational acceleration (m/s2)

J_K : phase superficial velocity (m/s)

$J_{L,D}$: discharged superficial liquid velocity (m/s)

$J_K{}^*$: Wallis dimensionless number of superficial velocity (-)

L : characteristic length (m)

L_H : length of horizontal leg (m)

$\dot{m}_G$: gas mass flow rate (kg/s)

$\dot{m}_{L,D}$: discharged liquid flow rate (kg/s)

u_K : phase mean velocity (m/s)

Greek Letter

α : gas void fraction (-)

G : void fraction at the onset of slugging at the hydraulic jump near the pipe bend (-)

ρ_k : liquid and gas density (kg/m^3)

$\tau_{L,G}$: wall shear stresses of the gas and liquid onto the free surface

τ_{wk} : wall shear stress (N/m^2)

τ_i : interfacial shear stress (N/m^2)