# INTERFACIAL INSTABILITIES OF A MISCIBLE DROPLET IN A HELE-SHAW CELL


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**ABSTRACT**

NUMERICAL SIMULATIONS OF FINGERING STABILITIES IN A MISCIBLE ROTATING HELE-SHAW FLOW IN BOTH THE PREWETTED AND DRY SITUATIONS BY MEANS OF HIGH ACCURATE NUMERICAL SCHEMES ARE PRE -SENTED. THE INTERFACIAL INSTABILITY IS DOMINATED BY THREE CONTROL PARAMETERS, SUCH AS RO -TATING SPEED, VISCOSITY CONTRAST, AND DIFFUSION BETWEEN THE SPECIES. UNSTABLE MECHANISM IS RESULTED FROM THE CENTRIFUGAL FORCE IF THE HEAVIER ANNULUS, IN GENERAL MORE VISCOUS TH -AT PROVIDES STABLE VISCOUS DAMPING EFFECT. THE EFFECT OF STRONGER DIFFUSION IS NOT SIGNI -FICANT TO THE FINGERING PATTERNS, BUT LEADS ONLY TO MILDER INSTABILITY. THE INTERFACIAL STABILITY APPEARS MORE COMPLEX FOR A MORE VISCOUS MISCIBLE ANNULUS, OR THE INJECTION OF L -ESS VISCOUS FLUID. THE OUTER INTERFACE IS ROTATIONAL UNSTABLE AND VISCOUS STABLE.HOWEVER ,THE INNER FRONT PERFORMS DIFFERENTLY.THE INJECTING STRENGTH TENDS TO STABILIZE THE OUTER INTERFACE, AND PERTURBS THE INNER. IN GENERAL,INERTIAL REFERENCE CONDITION LEADS TO MORE SIGNIFICANT INSTABILITIES ASSOCIA -TED WITH MULTI-LAYER FRONT, WHICH IS SIMILAR TO THE EMISSION OF LIQUID DROPLETS FOUND IN IMMISCIBLE EXPERIMENTAL RESULTS (CARRILLO ET AL 2000).



Keywords : MISCIBLE FLOW, NUMERICAL SIMULATION, HELE-SHAW CELL, INTERFACIAL INSTABILITIES


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