

## 하부전도체가 존재하는 자연대류 현상에 대한 수치적 연구

이재룡<sup>†</sup>(부산대) · 하만영<sup>\*</sup>(부산대) · S.Balachandar<sup>\*\*</sup>(UIUC)

### Thermal Convection in a Horizontal Layer of Fluid with Conducting Lid at Bottom

Jae Ryong Lee, Man Yeong Ha and S. Balachandar

**Key Words:** Thermal Convection(자연대류), Heat Transfer(열전달), Effect Rayleigh Number(유효 레일리 수)

**Abstract :** This study of thermal convection uses the following geometry: a horizontal layer of fluid heated from below of solid lid at bottom and cooled from above. A various range of thermal conductivity ratio,  $k$ , is considered to investigate the interface temperature,  $\theta_i$  between solid and fluid region. Periodic boundary conditions are employed in the horizontal direction to allow for lateral freedom for the convection cells. Two- and three-dimensional solution are obtained, using an accurate and efficient Chebyshev spectral multi-domain methodology, for different effective Rayleigh numbers,  $Ra_{eff}$  varying over the range of  $10^4$  to  $10^7$ .

## Lamp House 내의 열유동 특성에 관한 수치적 연구

서원호<sup>\*</sup>(LG전자) · 김영완<sup>†</sup>(성균관대 원) · 김윤제<sup>\*\*</sup>(성균관대)

### Numerical Analysis on Heat Transfer Characteristics in a Lamp House

Won-Ho Seo, Young-Wan Kim and Youn J. Kim

**Key Words:** Lamp House (램프 하우스), Exposure Device (노광기), Mercury Lamp (수은등)

**Abstract :** Collimation proximity exposure system that transfers the pattern on wafer or glass exactly using mask and light with appropriate wavelength is core process in semiconductor and liquid display element which used in PDP(Plasma Display Panel), ELD(Electroluminescent Display) and FED(Field Emission Display), etc. Performances of resolution required in precision exposure system are evaluated by resolving power, depth of focus and storage area. The optical design including lamp house has played an important role on performance of exposure process. In this study, we evaluate the cooling system, concerning on exposure device with mercury lamp among the kernel equipment for the production of LCD, to prevent the instability of lighting due to long term accumulation of excessive heating inside the lamp house. The characteristics of three-dimensional flow, pressure and heat distribution with time variable about exposure system are graphically depicted to estimate the cooling systems for lamp house.