DSMC(Direct simulation of Monte Carlo)방법을 이용한 하드디스크 헤드 주변 유동특성 연구

박민규[†] · 류동훈[*] · 이진호[*](연세대)

A Study on Flow characteristics of HDD(Hard Disk Drive) Head Element using DSMC(Direct simulation of Monte Carlo) method

Minkyu Park, Donghun Ryu and Jinho Lee

Key Words: DSMC(몬테카를로직접모사), Air Bearing System(공기베어링시스템), Tangential Momentum accommodation coefficient(접선운동량조정계수)

Abstract : To increase the capacity of information storage devices, the distance between HDD head and disk surface is decreasing continuously. This makes the characteristic dimension is comparable with mean free path of intervening gas, thus flow analysis between head element and disk surface is not feasible with conventional N-S equation because of non-continuum effects. DSMC is one of particle based DNS(Direct Numerical Simulation) methods that uses no continuum assumption. In this paper, flow between head element and disk surface is modeled to a 2-D inverse step slider and is studied using DSMC. Pressure and shear distribution on the slider surface are calculated with accommodation coefficient α, disk velocity and Knudesn number as parameters.

화학센서 내 마이크로 채널 유동 특성이 응답시간에 미치는 영향

김광수[†](성균관대 원) · 김윤제[*](성균관대)

An Influence of Microchannel Flow Characteristics on the Response Time of Chemical Sensor

Kwang-Su Kim and Youn-Jea Kim

Key Words: chemical sensor(화학센서), fictitious temperature (가상 온도), microchannel flow (마이크로채널 유동), response time (응답 시간)

Abstract : Since the concentration of analyte affects the response time of a sensor, the optimization of polymer-based enrichment layers has been investigated. Although the flow characteristics in microchannel of the chemical sensor are important, a few studies have been reported. In this study, the characteristics of the response time are obtained with a polymer coated mid-infrared sensor and various flow characteristics, velocity, flow rate, and so on. To elucidate the mass transfer in two connected domains with the jump boundary conditions, we applied analogous heat transfer problem using fictitious dimensionless temperature. The results show good agreement to other studies.