

원판형 분자 드래그펌프 회전자와 고정자 사이 간극 크기가 배기성능에 미치는 영향 대한 연구

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The pumping characteristics of a single-stage disk-type drag pump (DTDP) are calculated, for the variation of the vertical clearance between a rotor and stator and of the radial clearance between a rotor and casing wall, by the three-dimensional direct simulation Monte Carlo (DSMC) method⁽¹⁾. The gas flow mainly belongs to the molecular transition flow region. Spiral channels of a DTDP are cut on the both the upper and lower sides of a rotating disk, but the stationary disks are planar. The interaction between molecules is described by the variable hard-sphere model. The no time counter method is used as a collision sampling technique. For the calculation of the rotational energy exchange between the colliding molecules, the Borgnakke-Larsen phenomenological model is employed. As a consequence of results, the vertical and radial clearances have a significant effect on the pumping performance. Velocity and density fields were obtained for the spiral channel on the rotor by the DSMC simulation. Experiments are performed under the outlet pressure range of 0.4 ~ 533 Pa⁽²⁾. When the numerical results are compared to the experimental data, the numerical results agree well qualitatively.

[참고문헌]

1. Bird, G. A., *Molecular Gas Dynamics and the Direct Simulation of Gas Flows*, Clarendon, Oxford(1994).
2. 권명근, 허중식, 황영규, “다단 원판형 드래그펌프의 배기 성능에 관한 실험적 연구” 한국진공학회지, 12권, 2호, pp. 79-85 (2003).