정상상태에서 정전기장하에 기울어진 판 위를 흐르는 유체의 웨이브 관찰

박종진, 우행언, 장정익*, 김 효
서울시립대학교 화학공학과
(jaguar05@hanmail.net*)

Visualization of free surface wave of film flow down an inclined plane under an electrostatic field: Experimental schemes

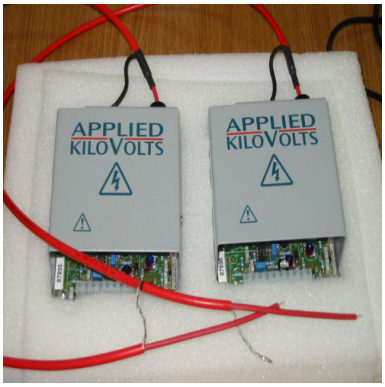
Jong Jin Park, On Haeng Woo, Ik Jung Jang*, Hyo Kim
Department of Chemical Engineering, the University of Seoul
(jaguar05@hanmail.net*)

Introduction

We would plentifully listen to the word which is a chopping wave with economical and cultural terminology. And from the past this wave is been big danger between sailors. A special of quality of this wave is to keep big energy because the wave energy of the wave is not offset and being maintained when it reaches to the maximum. We will make a experiment that we will make a wave which is a tabloid edition of this tripodal wave. The energy unit is to preserve the energy so that kinetic energy of the material to convert by electric energy. And a objection of this experiment is to observe the change of this wave of fluid flowing down on inclined plane in electrostatic field in steady-state. However we aren't ready to make a experiment. So we will make a introduction apparatus to you in this papers.

Appratus

1. Power Supply



Unit : K030PAA300
Serial No : 87935
Date of Manufacture : Dec 05
Input : 24V - 0.5A
Made in England

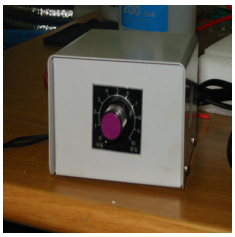
- This is a equipment which creates static electrocity but we don't have accouterments. So we can't create static electrocity.

2. Silicon Oil

KF - 96 Shinetsu Silicone (1000CS) | Dow Corning 200 fluid (100CS)

- The first time we were planed to use 100CS silicone oil. But it is too watery and fast of its flowing velocity. So we are planning to use 1000CS silicone oils or mixtures of 1000CS and 100CS.

3. Pump



Model : CS - 0720A
Power Supply : DC 24V
Serial No : 030220664
CSE CO., LTD.

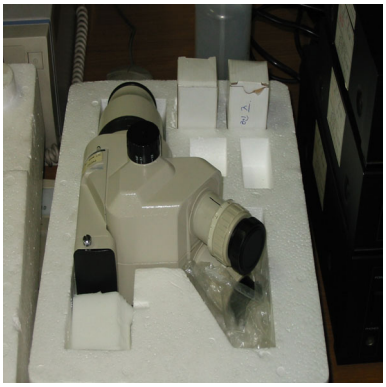
- This is a pump which pulls up fluids flowing down on inclined plane. And it push up fluids. So the fluids are circulated by pump. This second photo is a regulator of pump.

4. Inclined Plane

Model : YJ - 0512
U Jin Co., LTD

- This photo is a lower side. In the persent a upper side is separated to set up a equipment which create static electrocity. This apparatus can be regulated slope. So we are planning to observe the change of flowing fluids with the change of slope.

5. Microscope



Ocular : WF10X / 22 → two

- A objective of this equipment is the change of a wave. It is set up at side of the inclined plane. So it will view the change of the wave and take a photograph with digital camera.

Procedures

We don't have enough equipments. So we can't set up eqiupments perfectly and make a experiment. In the event our papers are introduction of apparatus in importance. But procedure are introduced to you in brief. First we arrange equipments as at left photo. And then after it overflows on the inclined plane for making steady-state, we have made the film at a constant thickness. At this time since channeling is occurred when water flows on an inclined plate slowly, so to avoid this we use silicone oil. But silicone oil that kinematic viscosity is 1000CS is too thick. So we are planning to use silicone oils of 100CS or mixtures. In steady-state we overflows on the inclined plane. Then we observe the wave that flows down on the inclined plane in electrostatic field. We expect continuous flow of fluids by eletrostatic energy even if there is effect of gravity. Since effect of gravity the wave is too weak. But we will observe size of the wave as electrostatic energy.

Conclusions

In conclusion, we don't have any data or value because we couldn't set up equipments. So we make a introduction equipments. We introduced to name, quality and usage of each apparatus. Our experiment begins now. In this papers we can't submit any data but we will present with accurate data in next papers. If this experiment is executed correctly, we will expect to prove theory as for effect of electrostatic energy to flowing fluids.

References

1. R. Byron Bird, Warren E. Stewart and Edwin N. Lightfoot, *Transport Phenomena*, 2nd ed., Wiley, New York, NY(2002).
2. Kwang Suk Kim, *Nonlinear Dynamics of a Small Reynolds Number-Film Flow under an Electrostatic Field*, Chmical Engineering, Universty of Seoul, Seoul(2006).