27th IEEE Symposium on Fusion Engineering



Contribution ID: 301

Type: Poster

## Experimental Study on the Liquid Lithium Film Flow characteristics under Spanwise direction Magnetic field

Tuesday 6 June 2017 13:40 (2 hours)

Using liquid lithium film as the plasma facing component (PFC) is the prospective scheme in the future magnetic confinement fusion to withstand the plenty heat flux and improve the plasma performance. Under the magnetic field along the film spanwise direction, the lithium film flow will exhibit a complicated flow characteristics induced by the action of extra Lorentz force, which named magnetohydrodynamic (MHD) effect. Because of the lithium physical properties (e.g high melting point, high chemical activity and so on) and the space limitation of the magnet, some preliminary experimental studies are carried out by using the room temperature liquid metal Galinstan, which proved that the spanwise magnetic field could thicken the film, suppress the film flow turbulence, detach the flow away from the side wall, change the film surface wall, and so on. However, these experimental results can not apply to lithium entirely because of the great differences in physical properties (i.e the density of the lithium is small than one tenth of the Galinstan). In the present paper, the experimental facility of liquid lithium film flow under uniform spanwise magnetic field has been established at UCAS (University of Chinese Academy of Science), in order to study the spanwise magnetic influence on the lithium film behaviors. The test section, which is made by stainless steel, with the upside visible, enables to produce the lithium film flow with a width of 60mm and inclined angle of 60. The flow rate, which is driven by the high pressure argon, could be adjusted from 0 to 10 L/min. The strength of the external magnetic field, which is generated by an electromagnet, is varied from 0 to 2T, with maximal unevenness lower than 5%. Experimental results show that the lithium film flow in the stainless-steel test section is significantly changed by the spanwise direction magnetic field, the surface waves are suppressed and became more stable. Finally, some quantitative analyses are also carried in present paper.

## Eligible for student paper award?

No

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Session Classification: T.POS: Poster Session T

Track Classification: Plasma facing components