5th Asia-Pacific Conference on Plasma Physics, 26 Sept-1Oct, 2021, Remote e-conference

Ionization of Gas Jet Impinging onto Water: Stabilizing or Destabilizing?

Sanghoo Park[1], Wonho Choe[2,3], Hyungyu Lee[3], Joo Young Park[4], Jinwoo Kim[3], Se Youn Moon[5], and Uroš Cvelbar[6]

[1] Institute of Plasma Technology, Korea Institute of Fusion Energy (KFE), [2] Department of Nuclear and Quantum Engineering, KAIST, [3] Department of Physics, KAIST, [4] Korea Institute of Materials Science (KIMS), [5] Department of Quantum System Engineering, Chonbuk National University, [6] Jožef Stefan Institute

e-mail (speaker): sanghoopark@kfe.re.kr

Interfacial phenomena between gas and liquid have attracted considerable interest from both fundamental and applied perspectives. In particular, the gas-driven depression of a liquid surface is commonly observed during top-blown industrial processes and in natural processes such as the dynamic coupling of wind and ocean. Many of us are empirically familiar with the creation of a stable or unstable cavity at a water surface by a normally impinging gas jet. Here, we report an intriguing behaviour of a cavity created by an impinging 'weakly-ionized' gas jet upon the water surface in the modelled system. Typically, when a high voltage is applied to a conductive gas nozzle as gas is flowing, the gas jet becomes ionized, whose characteristic degree of ionization is very low. After the ionized gas jet (a so-called 'cold plasma jet') is formed in the gas gap and cavity, surprisingly, we find that there are significant changes in the cavity shape and its stability; certain forces exerted by the plasma jet axially elongate the cavity and make it more stable. In this presentation, the effects of weak ionization of the gas jet on the gas–liquid system and relevant principles will be discussed.

References

Sanghoo Park et al., Nature **592**, 49–53 (2021).