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Transient model for characterizing the erosion mixing of stratified layer and turbulent impinging jet with both density and pressure gradients[1] WOOYOUNG LEE, SIMON SONG, Institute of Nano Science and Technology, Hanyang University, Seoul, Republic of Korea, YOUNG SU NA, Dept. of Thermal Hydraulics and Severe Accident Research, Korea Atomic Energy Research Institute, Daejeon, Republic of Korea — The erosion mixing phenomenon of a stratified hydrogen layer caused by a turbulent impinging jet determines the distribution and mixing characteristics of hydrogen gas in a containment building of nuclear power plants (NPPs) during a severe accident. The mixed hydrogen gas can explode when in contact with ignition sources. To prevent the risk of the hydrogen explosion, it is necessary to quantitatively analyze the transient erosion mixing process over a long period of time. We experimentally and theoretically investigate the long-term erosion mixing process by the interaction between a stratified layer and a turbulent impinging jet. As a result, we propose a transient model for predicting the interface displacement of the stratified layer and the mean axial velocity and half width of the jet. We found that the prediction accuracy strongly depends on the consideration of the density and pressure gradient of the stratified layer and the jet. The results show that the predictions are in good agreement with the experimental data.

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