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Computational analysis for dry-ice sublimation assisted CO_2 jet impingement flow SONGMI KWAK, JAESEON LEE, UNIST — The flow and heat transfer characteristics of the novel gas-solid two-phase jet impingement are investigated computationally. When the high pressure carbon dioxide (CO_2) flow passes through a nozzle or orifice, it experiences the sudden expansion and the rapid temperature drop occurred by Joule-Thomson effect. This temperature drop causes the lower bulk jet fluid temperature than the CO_2 sublimation line, so dry-ice becomes formed. By using CO_2 gas-solid mixture as a working fluid of jet impingement, it is expected the heat transfer enhancement can be achieved due to the low bulk temperature and the additional phase change latent heat. In this study, 2D CFD model is created to predict the cooling effect of gas-solid CO_2 jet. The gas-solid CO_2 flow is considered by Euler-Lagrangian approach of mixed phase and the additional heat transfer module is embedded to account for the sublimation phenomena of the solid state CO_2. The jet flow and heat transfer performance of gas-solid CO_2 jet is investigated by the variance of flow parameter like Reynolds number, solid phase concentration and jet geometries.

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