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# Response of Impinging Jets against a Target Wall with Suction Hole to Pulsating Disturbances

**Keiichiro Suzuki[1], Kotaro Sato[2], Kaito Suzuki[1]**
[1] Mechanical Engineering Program in the Graduate School of Engineering/Kogakuin University
2665-1 Nakano-cho, Hachioji-shi, Tokyo 192-0015, Japan
am24039@ns.kogakuin.ac.jp
[2]Department of Mechanical System Engineering/Kogakuin University
2665-1 Nakano-cho, Hachioji-shi, Tokyo 192-0015, Japan

## Extended Abstract

Impinging jets are used in many areas, such as the heating, cooling, and drying of objects, because they are capable of achieving large heat and mass transfer coefficients. Accordingly, many fundamental studies focused on impinging jets have been conducted[1]. Specifically, the relationship between the flow characteristics and heat transfer coefficient has been discussed in detail to improve the heat exchange efficiency by impinging jets [2], [3].

However, despite its importance, the response of impinging jets to pulsating disturbances remains obscure. In particular, the impinging jet strength (durability against disturbances) in the presence of both blowing and suction on the boundary wall, as in the cases of air conditioning and ventilation in rooms or cabins of vehicles, has remained largely unexplored. [4] [5]

In this study, flow visualization experiments and numerical calculations were conducted, focusing on the response characteristics of two-dimensional impinging jets to pulsating disturbances. Jet-blowing and suction slots were placed on a wall, and the distance from the jet blowing slot to the target wall with a suction slot and the initial flow rate were held constant. Under these conditions, pulsating disturbances (vortex pairs) were applied from the vertical direction to the jets with various slot widths. To evaluate the jet intensity, the change in flow velocity (fluctuation) for the developed steady flow was investigated. Generally, the jet blowing slot width is treated as the representative length; however, in colliding jet situations, where the room size is defined, it is easier from a design point of view to use the distance from the jet blowing slot to the target wall as the representative length. In this study, the distance between the jet blowing slot and target wall was defined as the representative length. The deviation from the steady-state velocity distribution owing to the disturbance was quantitatively calculated, based mainly on the velocity distribution of a well-developed impinging jet. The required restoration time was also measured, and the impinging jet strength was discussed in terms of the two indices.

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