

# Boundary Perturbation Method for Asymmetric Impinging Jets

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We consider a 2D potential flow that emanates from a nozzle, and impinges to a straight wall. The nozzle is assumed to be arbitrarily asymmetric and located at the end of an infinitely parallel pipe with finite width. The problem is laid on determining the free boundary between the flow and the surrounding air.

Traditionally, it has been solved using the hodograph transformation in complex plane. Extraordinary works are done in early 1980's. Alt, Caffarelli, and Friedman have introduced variational approaches to prove the existence, uniqueness, and regularity of the solution.

In this talk, we introduce a layer potential approach and then derive a particular boundary integral equations due to the perturbation of free boundary. Based on these integrals, we can address an iterative scheme to efficiently calculate asymmetric impinging jets. According to our computational results, this method enables us to obtain the converging solutions. The convergence is fast enough to compete with other methods and moreover it can be extended to other problems involving free boundary.