Motion of the inviscid gas through a nozzle -existence of a time global solution and invariant regions-

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We are concerned with the motion of the gas through a nozzle. The phenomena are governed by the compressible Euler equations. First, we review how the nozzle flow is applied in physics and engineering. Moreover, we refer to the relation between the nozzle flow and the solar wind, which is caused by an aurora. Next, we consider the existence of a time global solution for the present problem. We survey the relative results and the main theorem in this talk. Finally, we study the bounded estimate of solutions, which is the most difficult point to prove the time global existence. Then, invariant regions play an important role. In this talk, to solve our problem, we introduce an invariant region depending on a space variable.