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(57) Abstract :
Abstract The boundary solution of a partial differential equation is said to be periodic if it is spatially smooth, satisfies the continuity equation, and therefore is congruent with the incompressible flow. The initial velocity field in the Navier-Stokes equation must be convergent. Although it is commonly believed that if an initial condition satisfies a boundary condition, then the two conditions are congruent, this is not the case. The Navier-Stokes equation's entire compatibility requirement may not be met for such an environment. The solution is irregular at the outset if the requirement has not been met. Although fluid dynamics research as a whole is aware of the problem, it has only recently received widespread attention. In this research, we provide a workable computation method for determining if the two systems are compatible. In addition, a periodical channel flow is also described that fails the seamless initial condition with no spatially smooth approach at the onset of the stream. The analysis and computations were carried out in a rational framework. In the absolute lack of wall-normal velocity, the findings for just a channel configuration demonstrate that the constraint is always satisfied, and the issue has a periodic solution. The condition is often not achieved if the wall-normal acceleration of an object is non-zero, although counter-examples could be constructed using optimization techniques. To ensure proper beginning conditions for delicate time-dependent numerical simulations, the technique of generating such a field is helpful. The given approaches may help you figure out if the selected starting conditions apply or not.

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