

عنوان مقاله:

Aplication of Hybrid Immersed Boundary Method for the Simulation of Compressible Flow Around a Sphere

محل انتشار:

پنجمین کنفرانس توسعه فناوری در مهندسی مکانیک و هوافضا (سال: 1400)

تعداد صفحات اصل مقاله: 15

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خلاصه مقاله:

In the present paper, we introduce a new hybrid immersed boundary method (IBM) for the simulation of compressible viscous flows around stationary and moving bodies. The present approach incorporates the Brinkman penalization method and the compressible boundary condition-enforced IBM proposed by Qiu. The boundary condition-enforced IBM uses a fractional step method alongside a smooth Dirac delta function to satisfy the boundary conditions. This method simulates correctly the subsonic flows, although for the supersonic flow cannot physically simulate the wake region. On the other hand, the penalization method considers the body as a porous media with very low permeability, and makes the velocity and energy inside the body to converge to the body velocity and energy. This method works well for subsonic and supersonic regimes, However, unlike Qiu's method, streamlines penetrate the body and there is no distinctive interface between the flow inside and outside the body. In the presented IBM, the positive features of the two above-mentioned methods are included and their drawbacks are eliminated. After validation of the present method, compressible flow around a sphere is investigated.

کلمات کلیدی:

Immersed boundary method, Compressible fluid flow, Penalization method, Flow around sphere

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