幾種數值方法於穴流模擬之比較

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摘　要

　　本研究藉由求解穴流(cavity flow)，評估分割操作有限解析法(fractional-step finite analytic method)、混合有限差分法(hybrid finite difference scheme)與 CS 內插特性法(characteristics method with cubic-spline interpolation)之計算結果。在數值穩定性方面，分割操作有限解析法僅於低雷諾數時可以求解出穴流穩定狀態(steady state)，而混合有限差分法與 CS 內插特性法，無論雷諾數高低皆能求解，為穩定之數值方法。在準確性考量上，混合有限差分法與 CS 內插特性法準確度相似，但 CS 內插特性法略優於混合有限差分法，而分割操作有限解析則有誤差產生。

關鍵詞：有限解析法、有限差分法、特性法、穴流

The comparisons of several numerical schemes used for cavity flow simulation

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Abstract

The main goal of this study is to examine the suitability of three numerical schemes for computation cavity flow. The three numerical schemes are the fractional-step finite analytic method, the hybrid finite difference scheme, and the characteristics method with cubic-spline interpolation. The fractional-step finite analytic method can only obtain convergent simulated results for small Reynolds number, whereas the other two schemes can give convincing computational results for larger Reynolds number. The hybrid finite difference scheme is simple to implement, but its accuracy seems to be less than the characteristics method with cubic-spline interpolation.

Key words：fractional steps、finite analytic、finite difference、characteristics method、cubic interpolation、cavity flow