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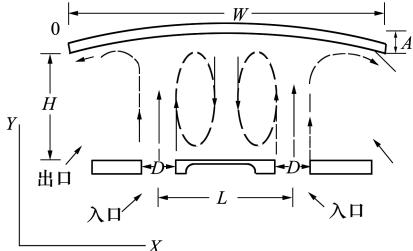
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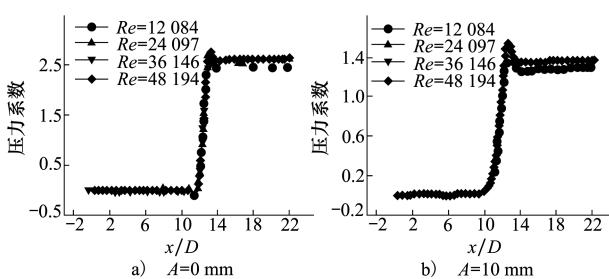
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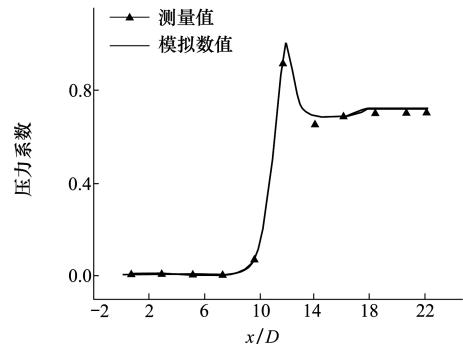
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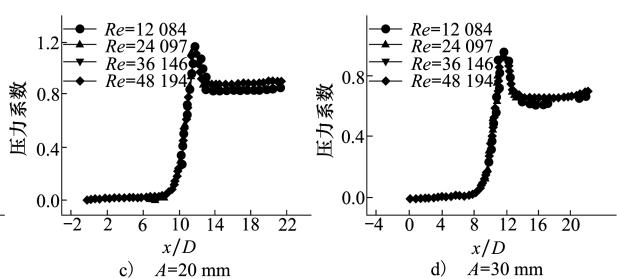


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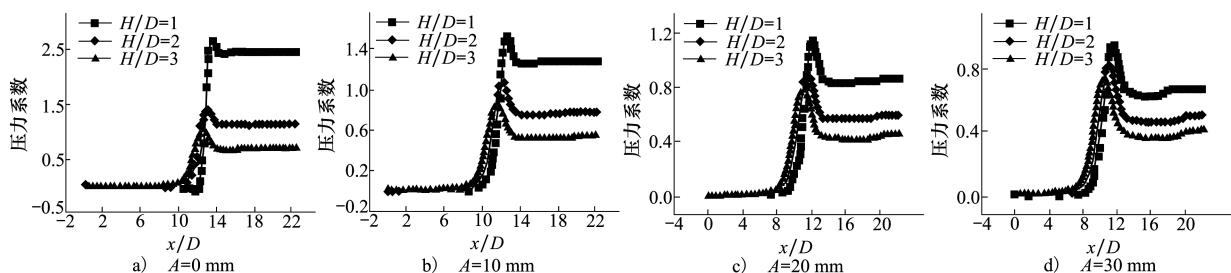
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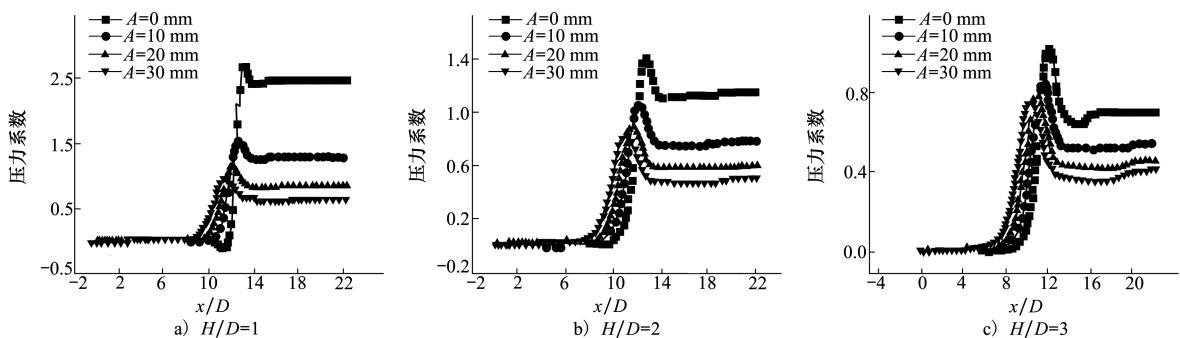
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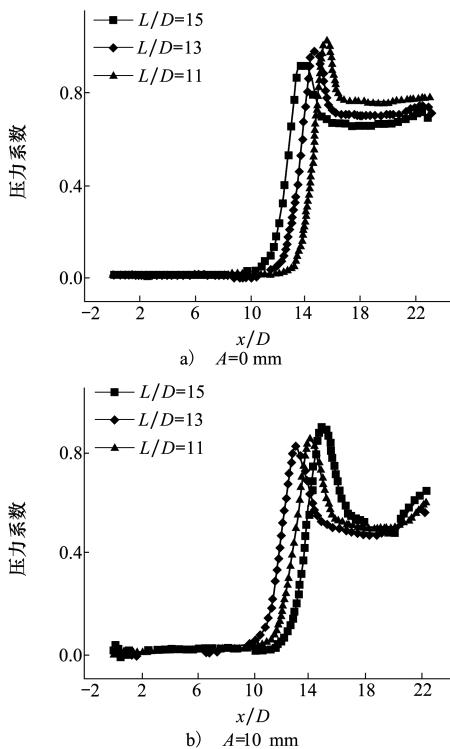
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3. Results and discussion

The results of the numerical simulation are presented in terms of the pressure coefficient (C_p) versus normalized distance (x/D). Figure 1 shows the variation of C_p for three different aspect ratios ($L/D = 15, 13, 11$) at two different locations: $A = 0 \text{ mm}$ and $A = 10 \text{ mm}$. The pressure coefficient remains low until $x/D \approx 12$, after which it rises sharply to a peak value of approximately 0.8, before settling to a steady-state value of about 0.75. The transition point occurs slightly earlier for larger aspect ratios. At $A = 10 \text{ mm}$, the transition point is shifted to $x/D \approx 13$.

The flow field is characterized by a primary separation zone downstream of the cylinder, where the flow becomes turbulent and disordered. The wake region is dominated by large-scale vortices, and the transition from laminar to turbulent flow is clearly visible in the pressure distribution. The wake length, defined as the distance from the cylinder to the point where the pressure has returned to its free-stream value, increases with the aspect ratio L/D .

The results of the numerical simulation are compared with experimental data obtained by E2(• 3i [20]. The numerical results show a good agreement with the experimental data, particularly for the aspect ratio $L/D = 15$. The transition point and the wake length are captured accurately by the numerical model.

In conclusion, the numerical simulation provides a detailed insight into the flow field around a circular cylinder, particularly the transition from laminar to turbulent flow and the resulting wake characteristics. The results are in good agreement with experimental data, validating the numerical model for this specific configuration.

