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Segmented predictor-corrector reentry guidance based on an analytical profile

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Overall Process of the Method

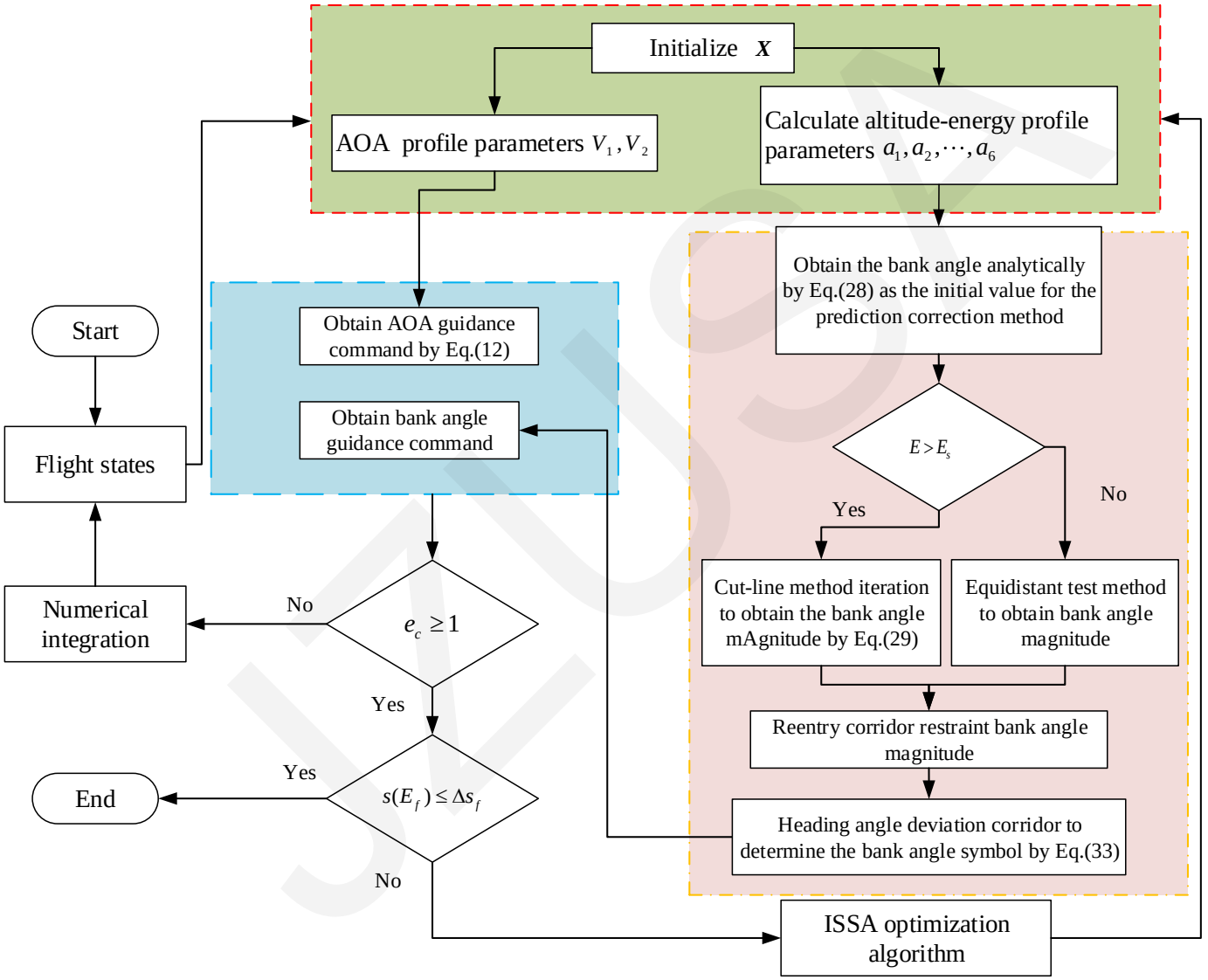


Fig. 1 Flowchart of the proposed novel guidance algorithm

Testing simulation

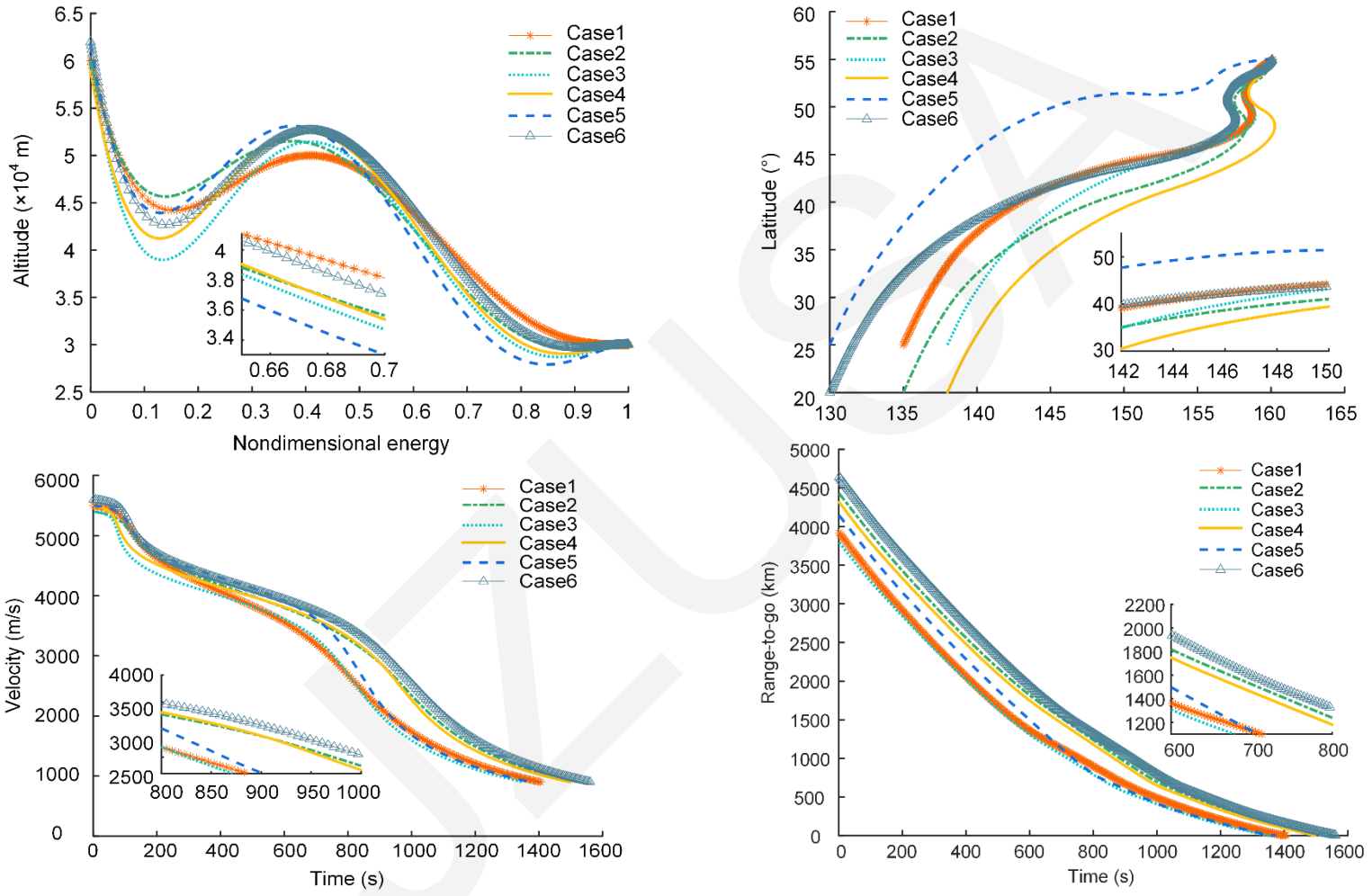


Fig. 2 Testing of the proposed analytical segmented predictor-corrector reentry guidance method

Comparisons Simulation

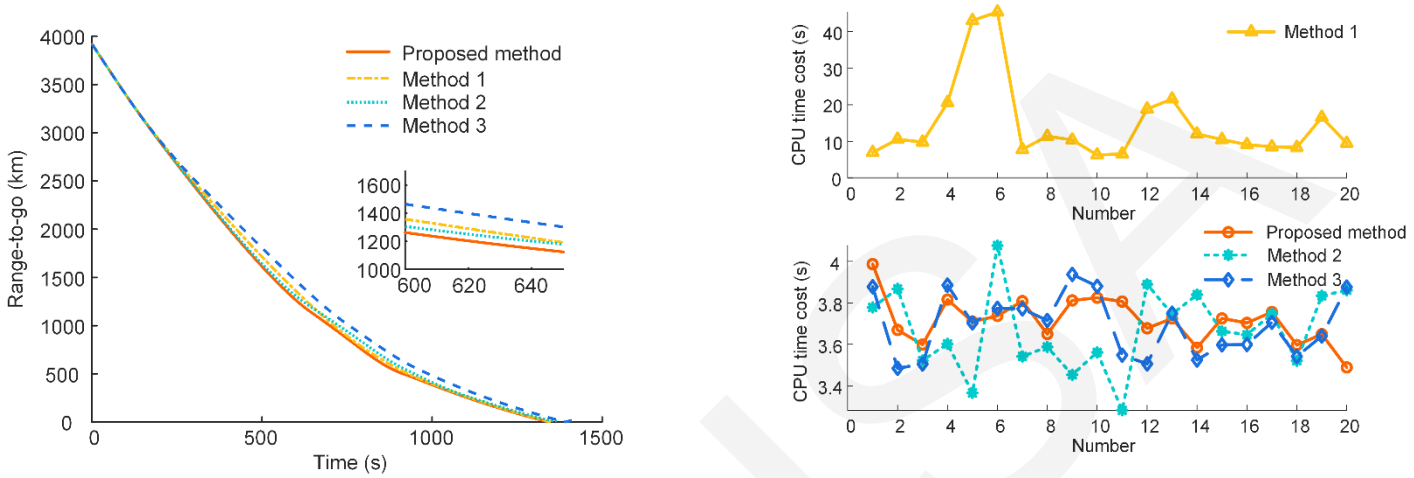


Fig. 3 Part of the comparative experimental results

Table 1 Statistical results and time cost

Time cost (s)	Best	Worst	Mean	Standard deviation
Proposed method	3.47	3.98	3.71	0.11
Method 1	6.25	45.29	14.64	11.04
Method 2	3.28	4.07	3.69	0.19
Method 3	3.48	3.93	3.70	0.14

Monte-Carlo simulations

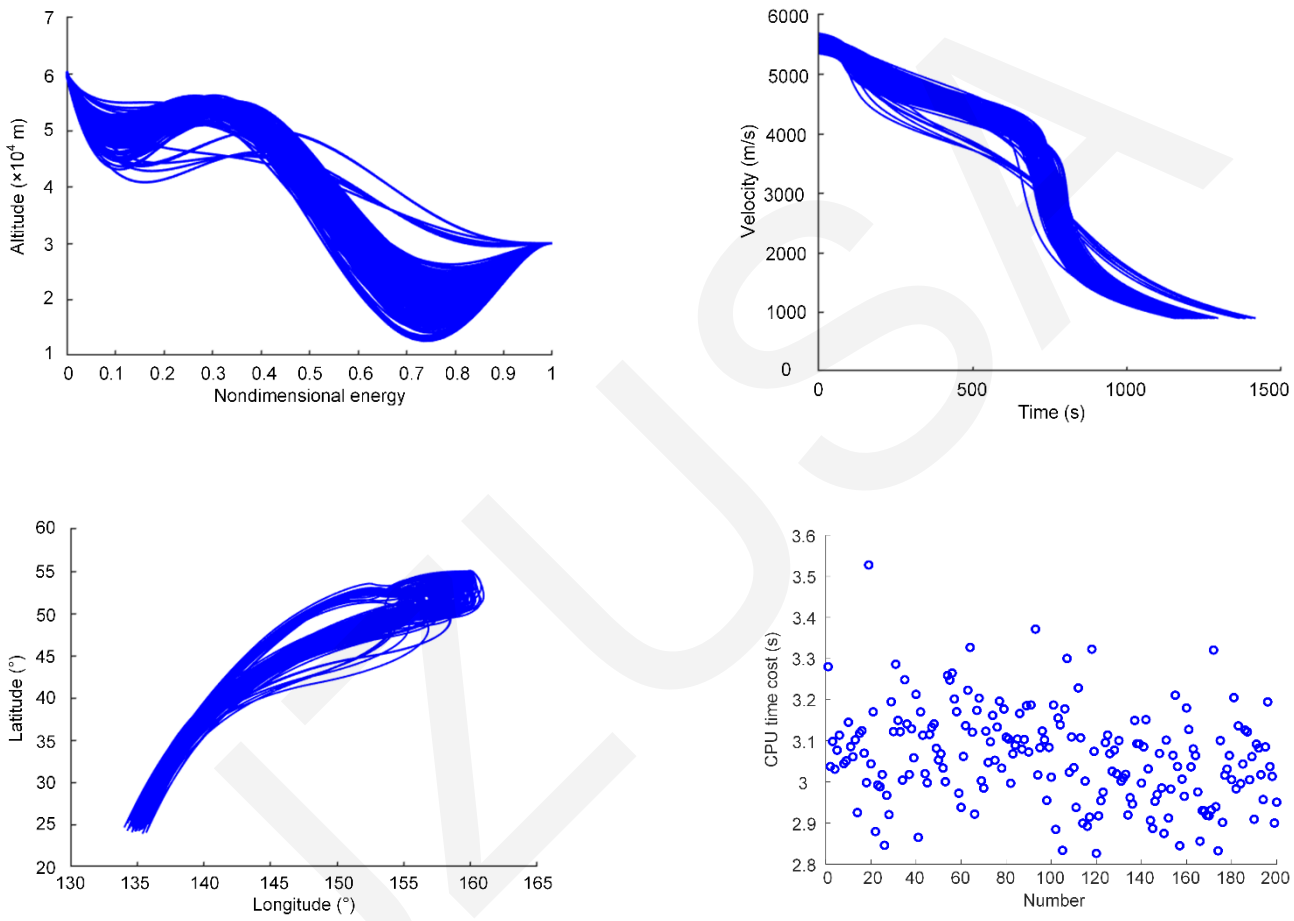


Fig. 4. Part of the Monte-Carlo simulation results.

Conclusions

- Based on the altitude-energy profile， the bank angle can be roughly obtained with an analytical form.
- An analytical segmented prediction method of range-to-go is proposed，which greatly improves the efficiency of range-to-go prediction, reducing the calculation time from 14.64 s to 3.71 s compared to the integral method for predicting range-to-go.
- Simulation results from various scenes, comparative experiments of four methods, and MonteCarlo simulation show that our proposed method has good accuracy, fast calculation speed, and robustness, indicating good potential for online appli-cation.

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