***The primary submission in single-column or two columns is available***

(Title usually falls within 3 lines. All lexical words, as well as prepositions over 5 letters (including 5) should be initials in capital.)

**Generation of dynamic grids and computation of unsteady transonic flows around assemblies**

(Author affiliations should be listed according to the name order under the paper title. Chinese authors should put the family name first. The corresponding author should be marked with “\*” on the top right.)

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Abstract

（Abstract should be about 150-200 words which can conclude the whole content of the paper (including purpose, method, results and conclusion). Equations, figures and tables, as well as references are not supposed to appear in this part. When abbreviation is firstly used, it should contain the full name with its abbreviation included in parentheses, such as “signal to noise ratio (SNR)”. Do NOT use the first person as subject. Do NOT repeat the title as the first sentence of the abstract. Simple sentence and active voice are preferred, and verb should be close to the subject.)

Low service ability of an airfield area causes frequent air traffic congestion and flight delays at busy airports. The airport system calls for capacity and efficiency improvements urgently to relieve the current congested situation. In this work, an optimization approach for the collaborative operating modes of multi-runway systems is proposed to balance the demand and capacity. Based on the theory of runway capacity envelope, a corresponding optimization model is established by introducing the capacity loss coefficient which objectively reflects the mode switching characteristics. Then an elitist non-dominating sorting genetic algorithm is designed combined with the multi-objective optimization theory, Compared with the single runway mode, the combined runway modes bring about a striking optimization effect which results in a 38.1% reduction in the cost of flight delays and a 46.4% decrease in the quantity of adjusted flights. The approach provided can significantly enhance collaborative operating efficiency of a multi-runway system, and effectively improve air traffic punctuality.

*Keywords*: Transonic flow; Unsteady flow; Full-potential equation; Assembly; flight delays (about 5-8 words separated with “;”; use small letters except technical terms. Abbreviations should contain full name with abbreviation included in parentheses. Selection of 1-2 from EI controlled term list is preferred:

\*Corresponding author. *E-mail address:* [abc@buaa.edu.cn](mailto:abc@buaa.edu.cn)

**1. Introduction**[[1]](#footnote-1)

(Begin each paragraph with an equal indentation of two typing spaces.)

The computation method of unsteady transonic flow based on N-S equations should be best accurate, but to three-dimensional complex problems, it can be achieved

only on large computers, and moreover, the results are not ideal sometimes. 1 A viscous/inviscid interaction method is an applicable one and the computation time can be reduced by two orders.

(Equations, figures and tables are usually not supposed to appear in this part.)

**2. Computation scheme**

*2.1. Governing equation*

2.1.1. Principle

The unsteady full-potential equation written in a body fitted coordinate system is given by

(1)



where ** is density, *U*, *V*, and *W* are the contravariant velocity components in the **, **, and ** directions,means time, and ***J***is Jacobian.



Eq. (1) is solved by the time-accurate approximate factorization algorithm and internal Newton iterations; 2 body conditions and wake conditions are implicit embedded.

*2.2. Generation of grids*

Taking the incompressible potential flow round a cylinder for example, the stream function is

(2)



where *a* is radius, and the velocity of free stream. Magnifying its radius to .



**3. Presentation of results**

*3.1. Artwork/Figure*

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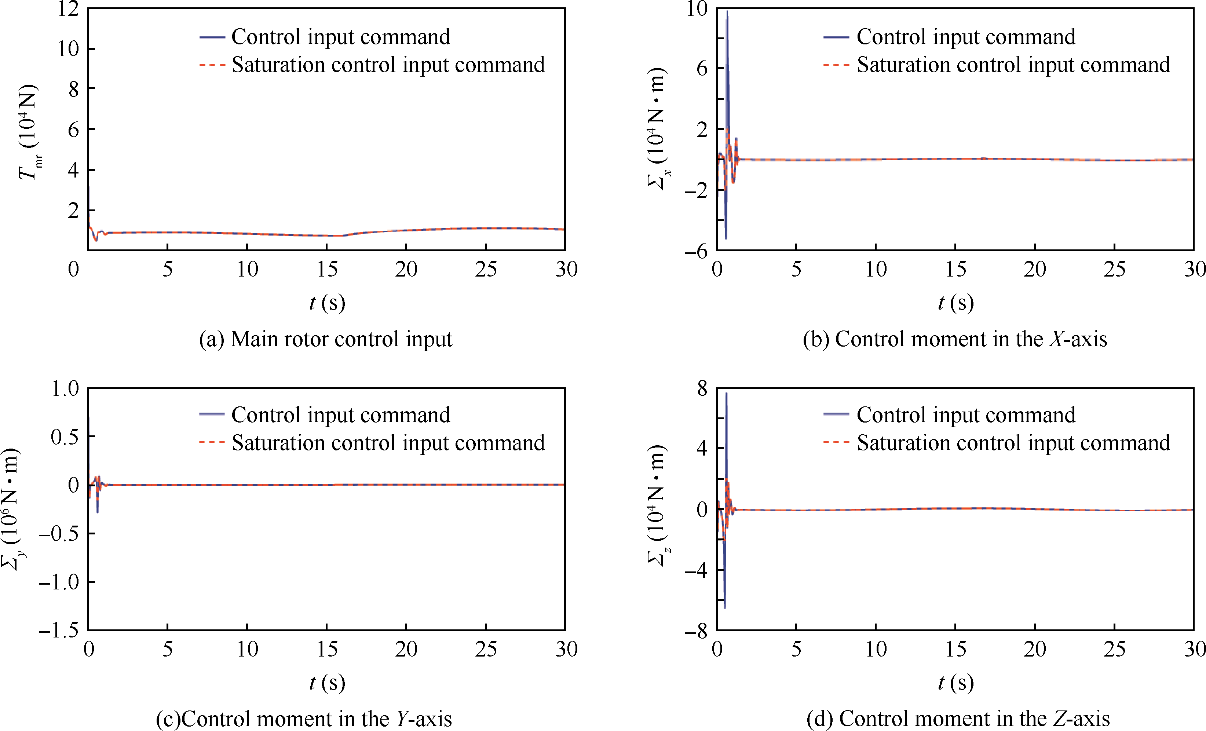


Fig. 1. Actual control input curves

Table 1 CPU time ratio of each term.

|  |  |
| --- | --- |
| Computational term | CPU time (%) |
| Flow field | 32.6 |
| Solid temperature field | 2.2 |
| Species concentration field | 4.3 |
| Radiation transfer/energy field | 60.9 |

**4. Conclusions**

(Conclusion should be summarized in points without tedious description of background, method, etc.)

(1) A rapid method of the generation of boundary-fitted dynamic grids is developed in this paper, and the method of Viscous/Inviscid Interaction is used to compute the unsteady aerodynamic forces on wing/missiles and wing/body with control surfaces.

(2) The computation results are in agreement with experimental data.

**Acknowledgements**

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**References**

Text: Indicate references by superscript numbers in the text. The actual authors can be referred to, but the reference number(s) must always be given.

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Examples:

Reference to a journal publication (**Journal names should be abbreviated, but if you are uncertain, keep it in full name)**

1. Van der Geer J, Hanraads JAJ, Lupton RA , et al. The art of writing a scientific article. *J Sci Commun* 2000;163(1):51–9.

Reference to a book

2. Strunk Jr W, White EB. *The elements of style*. 3rd ed. New York: Macmillan; 1979. p. 5-10.

Reference to a chapter in an edited book

3. Mettam GR, Adams LB. How to prepare an electronic version of your article. In: Jones BS, Smith RZ, editors. *Introduction to the electronic age*. New York: E- Publishing Inc.; 1999. p. 281–304.

Conference proceedings

Harnden P, Joffe JK, Jones WG, editors. Germ cell tumours V. *Proceedings of the 5th germ cell tumour conference*; 2001 Sep 13-15; Leeds, UK. New York: Springer; 2002.

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Christensen S, Oppacher F. An analysis of Koza's computational effort statistic for genetic programming. In: Foster JA, Lutton E, Miller J, et al. editors. Genetic programming. *EuroGP 2002: Proceedings of the 5th European conference on genetic programming*; 2002 Apr 3-5; Kinsdale, Ireland. Berlin: Springer; 2002. p. 182-91.

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Russell ML, Goth-Goldstein R, Apte MG, et al. Method for measuring the size distribution of airborne Rhinovirus. Berkeley (CA): Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division; 2002. Report No.: LBNL49574.

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Article not in English

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Homepage/Web site

Cancer-Pain.org [Internet]. New York: Association of Cancer Online Resources, Inc.; c2000-01 [updated 2002 May 16; cited 2002 Jul 9]. Available from: <http://www.cancer-pain.org/>

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**Appendix**

(Appendix is put behind biography unless otherwise specified. If there is more than one, order them with capitalized letters. If there are equations, order them with letters and numbers, such as “(A1)” and “(A2)”.)

1. [↑](#footnote-ref-1)