JOURNAL OF AIRCRAFT
Vol. 48, No. 4, July–August 2011

Technical Comments

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Comment on "Three-Dimensional Aerodynamic Simulations of Jumping Paratroopers and Falling Cargo Payloads"

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DOI: 10.2514/1.C000186

I. Introduction

COMMENTS are provided on aerodynamic simulations of a paratrooper and of a payload separating from an aircraft reported in Udoewa [1] using the deforming-spatial-domain/stabilized space–time (DSD/SST) formulation, mesh moving techniques, and the Fluid–Object Interactions Subcomputation Technique (FOIST).

The DSD/SST formulation was introduced in 1990 and was published (with the name DSD/ST) in a 1992 paper [2]. It has been the core numerical technology used by the Team for Advanced Flow Simulation and Modeling (TAFSM)[†] in computing fluid–object interaction (FOI) and fluid–structure interaction problems. The formulation gained an additional stabilization term in a later paper [3] in 1992, reached its current name of DSD/SST in a 1993 paper [4], and was supplemented with powerful mesh update techniques in a 1994 paper [5]. Advanced mesh update techniques for the DSD/SST formulation were also introduced by the TAFSM, starting with the 1993 paper [4], and they were introduced with more capabilities in the 1994 paper [5].

Aerodynamic simulation of a paratrooper jumping from an aircraft with the DSD/SST formulation was reported in a 1996 paper [6]. The aircraft model used in [6] was improved by adding wing flaps and winglets, and the simulation with that was reported in a 1999 paper [7]. The wing flaps and winglets can be seen in Fig. 11 of [7]. The simulation with the improved paratrooper model was reported in a 2001 conference paper [8]. Results obtained with the improved model can be seen in Figs. 1 and 2. This 2001 paper also included a payload model used in aerodynamic simulation of a payload dropped from the aircraft. The payload model can be seen in Fig. 3. The 2001 paper had several coauthors, besides the first coauthor Udoewa. These other coauthors played key roles in obtaining the results reported in the paper. They originated the core numerical formulations, developed the parallel computer programs, helped generate the aircraft, paratrooper, and payload models, and helped with setting up the simulation conditions.

The FOIST was first introduced and named in a 2001 paper [9]. It was described in Sec. 9, under the section heading "Fluid-Object Interactions Subcomputation Technique (FOIST)".

II. Conclusions

The core numerical technology used in the computations reported by Udoewa [1] is the DSD/SST formulation. On page 1727 of [1], the sentence ending with "... deforming spatial domain/stabilized space-time (DSD/SST) formulation." is attributing the DSD/SST formulation to the author's 2005 Ph.D. thesis. The DSD/SST formulation was introduced 15 years before that.

In Section II.B of [1], the paper is providing a lengthy description of the DSD/SST formulation, without any attribution. All the equations in that section are essentially identical to the equations given in the 1992 and 1994 papers [3,5]. The text in that section is a paraphrased version of the text in [3,5].

On Page 1727 of [1], it is stated, "The computations presented use mesh stiffening tactics, remeshing techniques, and projection methods that work well...". No reference is given other than Ref. [13] of the paper, which is another paper of the author ("submitted for publication"). The "stiffening tactics" used in the computations reported in the paper were developed long before that, starting with the 1993 paper [4]. The "remeshing techniques" and "projection methods" used were also developed long ago, starting with the 1994 paper [5]. Improved versions of these techniques were used in the paratrooper-separation computations reported in the 1996 paper [6].

On page 1727 of [1], the sentence "The fluid-object interaction subcomputation technique (FOIST) is such an alternative." is attributing the FOIST to the author's 2005 Ph.D. thesis. The FOIST was introduced 4 years before that, in a 2001 paper [9]. This was acknowledged by the author in Ref. [19] of the paper. But the paper left that out.

On page 1731 of [1], it is stated, "In this work, wing flaps and wing tips were added to construct a more accurate model." As explained in Sec. I of this technical comment, the wing flaps and winglets were added to the aircraft model earlier, and the simulation with that model was reported in a 1999 paper [7], submitted in January 1999. That was six months before the author of [1] joined the TAFSM.

The parallel FOI, mesh moving, and mesh projection programs used in the computations reported in the paper were mostly written by the members of the TAFSM before the author of [1] became a member. The author was given these programs when he first joined the TAFSM, was trained to use them, and made slight modifications. From the information provided in Sec. I of this technical comment, it is clear that the programs the author received were mostly in the stage used in the computations reported in the paper. While the paper is acknowledging the source of "The modeling software, 3-D surface mesh generator, and automatic 3-D mesh generator...," the source of the parallel FOI, mesh moving, and mesh projection programs is not acknowledged.

Several other members of the TAFSM played key roles in obtaining the results reported in the paper. They were coauthors of the 2001 conference paper [8]. Figures 13 and 28 of [1] are identical to Figs. 2 and 3 of the conference paper [8]. Much of the computational

Received 15 November 2009; accepted for publication 29 July 2010.

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[†]Data available at http://www.tafsm.org [retrieved 21 August 2010].

technology, models, and problem setup used in the computations reported in [1] were already in place when the conference paper [8] was submitted. The paper [1] gave no reference to [8].

Figures 1, 2, 3 (upper half), 5–13, and 22–30 of [1] are identical to the figures in the July 2001 presentation [10]. The presentation was used at the conference associated with the 2001 paper [8].

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