Takuya Terahara — *Curriculum Vitae*

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Education

B.Eng. Engineering, Waseda University, March 2015

M.Eng. Engineering, Waseda University, March 2017

Ph.D. Engineering, Waseda University, March 2020

Honors and Awards

Visualization Award for Outstanding Performance, The 21st Japan Society for Computational Engineering and Science Conference (2016) (H. Uchikawa, T. Sasaki, T. Terahara, K. Takizawa and T.E. Tezduyar)

Young Investigator Award, Research Committee on Blood Flow and Cardiovascular System (2017) (T. Terahara, T. Sasaki, K. Takizawa, T.E. Tezduyar)

Research Fellowship for Young Scientists (DC1) 17J11096 (JSPS), April 2017 – March 2020

Best CFD Visualization Award Special Prize, "Flow Analysis of Left Ventricle with Papillary Muscle Modeling", The 33th Computational Fluid Dynamics Symposium (2019)

Visualization Award for Outstanding Performance, The 25st Japan Society for Computational Engineering and Science Conference (2020)

Publications Summary

10	Journal Articles Indexed by the Web of Science	1	Other Journal Article
4	Book Chapters	8	Invited Conference Papers
58	Contributed Conference Papers		

Publications

Journal Articles Indexed by the Web of Science

1 K. Takizawa, T.E. Tezduyar, Y. Otoguro, **T. Terahara**, T. Kuraishi, and H. Hattori, "Turbocharger flow computations with the Space–Time Isogeometric Analysis (ST-IGA)", *Comput. Fluids*, **142** (2017) 15–20, doi: 10.1016/j.compfluid.2016.02.021.

2 K. Takizawa, T.E. Tezduyar, and **T. Terahara**, "Ram-air parachute structural and fluid mechanics computations with the space–time isogeometric analysis (ST-IGA)", *Comput. Fluids*, **141** (2016) 191–200, doi: 10.1016/j.compfluid.2016.05.027.

3 K. Takizawa, T.E. Tezduyar, **T. Terahara**, and T. Sasaki, "Heart valve flow computation with the integrated Space–Time VMS, Slip Interface, Topology Change and Isogeometric Discretization methods", *Comput. Fluids*, **158** (2017) 176–188, doi: 10.1016/j.compfluid.2016.11.012.

4 K. Takizawa, T.E. Tezduyar, H. Uchikawa, **T. Terahara**, T. Sasaki, and A. Yoshida, "Mesh refinement influence and cardiac-cycle flow periodicity in aorta flow analysis with isogeometric discretization", *Comput. Fluids*, **179** (2019) 790–798, doi: 10.1016/j.compfluid.2018.05.025.

5　**T. Terahara**, K. Takizawa, T.E. Tezduyar, Y. Bazilevs, and M.-C. Hsu, "Heart valve isogeometric sequentially-coupled FSI analysis with the space–time topology change method", *Comput. Mech.*, **65** (2020) 1167–1187, doi: 10.1007/s00466-019-01813-0.

6　**T. Terahara**, K. Takizawa, T.E. Tezduyar, A. Tsushima, and K. Shiozaki, "Ventricle-valve-aorta flow analysis with the Space–Time Isogeometric Discretization and Topology Change", *Comput. Mech.*, **65** (2020) 1343–1363, doi: 10.1007/s00466-020-01822-4.

7　T. Kuraishi, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Computational flow analysis with boundary layer and contact representation: I. Tire aerodynamics with road contact", *Journal of Mechanics*, **38** (2022) 77–87, doi: 10.1093/jom/ufac009.

8　**T. Terahara**, T. Kuraishi, K. Takizawa, and T.E. Tezduyar, "Computational flow analysis with boundary layer and contact representation: II. Heart valve flow with leaflet contact", *Journal of Mechanics*, **38** (2022) 185–194, doi: 10.1093/jom/ufac013.

9　**T. Terahara**, K. Takizawa, and T.E. Tezduyar, "T-splines computational membrane–cable structural mechanics with continuity and smoothness: I. Method and implementation", *Comput. Mech.*, published online, doi: 10.1007/s00466-022-02256-w, 2023, doi: 10.1007/s00466-022-02256-w.

10　**T. Terahara**, K. Takizawa, R. Avsar, and T.E. Tezduyar, "T-splines computational membrane–cable structural mechanics with continuity and smoothness: II. Spacecraft parachutes", *Comput. Mech.*, published online, doi: 10.1007/s00466-022-02265-9, 2023, doi: 10.1007/s00466-022-02265-9.

Other Journal Articles

1　K. Takizawa, Y. Bazilevs, T.E. Tezduyar, M.-C. Hsu, and T. Terahara, "Computational cardiovascular medicine with isogeometric analysis", *Journal of Advanced Engineering and Computation*, **6** (2022) 167–199, doi: 10.55579/jaec.202263.381.

Chapters in Books

1　K. Takizawa, T.E. Tezduyar, **T. Terahara**, and T. Sasaki, "Heart valve flow computation with the Space–Time Slip Interface Topology Change (ST-SI-TC) method and Isogeometric Analysis (IGA)", in P. Wriggers and T. Lenarz, editors, *Biomedical Technology: Modeling, Experiments and Simulation*, Lecture Notes in Applied and Comput. Mech., 77–99, Springer, 2018, ISBN 978-3-319-59547-4, doi: 10.1007/978-3-319-59548-1_6.

2　K. Takizawa, T.E. Tezduyar, H. Uchikawa, **T. Terahara**, T. Sasaki, K. Shiozaki, A. Yoshida, K. Komiya, and G. Inoue, "Aorta flow analysis and heart valve flow and structure analysis", in T.E. Tezduyar, editor, *Frontiers in Computational Fluid–Structure Interaction and Flow Simulation: Research from Lead Investigators under Forty – 2018*, Model. Simul. Sci. Eng., 29–89, Springer, 2018, ISBN 978-3-319-96468-3, doi: 10.1007/978-3-319-96469-0_2.

3　K. Takizawa, **T. Terahara**, and T.E. Tezduyar, "Space–time flow computation with contact between the moving solid surfaces", in F. Aldakheel, B. Hudobivnik, M. Soleimani, H. Wessels, C. Weissenfels, and M. Marino, editors, *Current Trends and Open Problems in Comput. Mech.*, 517–525, Springer, 2022, ISBN 978-3-030-87312-7, doi: 10.1007/978-3-030-87312-7_50.

4　**T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Heart valve computational flow analysis with boundary layer and leaflet contact representation", to appear in a special volume to be published by Springer, 2022.

Invited Conference Papers

1　Y. Otoguro, **T. Terahara**, K. Takizawa, T.E. Tezduyar, T. Kuraishi, and H. Hattori, "A higher-order ST-VMS method for turbocharger analysis", in *Proceedings of 13th Asian International Conference on Fluid Machinery*, Paper No. AICFM13-153, Tokyo, Japan, (2015).

2　Y. Otoguro, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "A general-purpose mesh generation method for fluid mechanics computations with the IGA", in *Extended Abstracts of USACM Conference on Isogeometric Analysis and Meshfree Methods*, California, USA, (2016).

3　**T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Heart valve flow analysis with space–time interface-tracking with topology change and isogeometric discretization", in *Extended Abstracts of the 12th World Congress on Comput. Mech. (WCCM XII) and the 6th Asia–Pacific Congress on Comput. Mech. (APCOM VI)*, Seoul, Korea, (2016).

4 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Aorta and heart valve flow analysis with the space–time topology change (ST-TC) method and NURBS in space", in *Extended Abstracts of USACM Conference on Isogeometric Analysis and Meshfree Methods*, California, USA, (2016).

5 **T. Terahara**, K. Takizawa, T.E. Tezduyar, and T. Sasaki, "Heart valve flow analysis with the integrated space–time VMS, slip interface, and topology change methods and isogeometric discretization", in *Extended Abstracts of the 2017 Engineering Mechanics Institute Conference*, California, USA, (2017).

6 **T. Terahara**, K. Takizawa, T.E. Tezduyar, M.-C. Hsu, and Y. Bazilevs, "Heart valve sequentially-coupled FSI analysis with the ST-SI-TC-IGA", in *Proceedings of IGA 2018*, Texas, USA, (2018).

7 **T. Terahara**, K. Takizawa, T.E. Tezduyar, R. Kobayashi, and A. Tsushima, "Ventricle-valve-aorta flow analysis with the space–time isogeometric discretization and topology change", in *Proceedings of the Asian Pacific Congress on Comput. Mech. (APCOM) 2019*, Taipei, Taiwan, (2019).

8 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Ventricle-valve-aorta flow analysis with the space–time isogeometric discretization and topology change", in *Extended Abstracts of the 15th World Congress on Comput. Mech. (WCCM XV) and the 8th Asia–Pacific Congress on Comput. Mech. (APCOM VIII)*, Online due to the COVID-19, (2022).

Contributed Conference Papers

1 **T. Terahara**, Y. Tsutsui, N. Toh, K. Takizawa, and T.E. Tezduyar, "Aerodynamic analysis of a ram-air parachute", in *Proceedings of the 28th Symposium on Computational Fluid Dynamics*, Tokyo, Japan, (2014).

2 N. Toh, Y. Tsutsui, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Parachute aerodynamic analysis with resolved geometric porosity", in *Proceedings of the 28th Symposium on Computational Fluid Dynamics*, Tokyo, Japan, (2014).

3 Y. Tsutsui, N. Toh, **T. Terahara**, K. Takizawa, T.E. Tezduyar, and C. Boswell, "Ringsail-parachute design studies based on aerodynamic-moment computation with resolved geometric porosity", in *Proceedings of 58th Symposium on Space Science and Technology*, Nagasaki, Japan, (2014).

4 **T. Terahara**, K. Takizawa, Y. Tsutsui, T. Kanai, and T.E. Tezduyar, "Aerodynamic analysis of a ram-air parachute", in *Proceedings of the 20th Japan Society for Computational Engineering and Science Conference*, Ibaraki, Japan, (2015).

5 Y. Otoguro, T. Kuraishi, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Space–time isogeometric analysis", in *Extended Abstracts of JST CREST–PRESTO Symposium 2015 — Mathematics for the 22nd Century*, Tokyo, Japan, (2015).

6 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Aerodynamics analysis of a ram-air parachute", in *Proceedings of the 34th JSST Annual International Conference on Simulation Technology*, Tokyo, Japan, (2015).

7 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Space–time isogeometric analysis of a ram-air parachute", in *Extended Abstracts of KSME–JSME Joint Symposium on Comput. Mech. & CAE 2015*, Tokyo, Japan, (2015).

8 Y. Otoguro, T. Kuraishi, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Space–time isogeometric analysis", in *Proceedings of Numerical Analysis: New Developments for Elucidating Interdisciplinary Problems*, Kyoto, Japan, (2015).

9 **T. Terahara**, K. Takizawa, T.E. Tezduyar, and T. Sasaki, "Heart-valve fluid mechanics computation with asymmetric valve motion", in *Proceedings of the 21st Japan Society for Computational Engineering and Science Conference*, Niigata, Japan, (2016).

10 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Fluid mechanics analysis of blood flow with aortic valve motion", in *Proceedings of JSME 28th Bioengineering Conference*, Tokyo, Japan, (2016).

11 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Fluid mechanics computation of aortic valve with wall motion", in *Proceedings of JSME 29th Comput. Mech. Division Conference*, Aichi, Japan, (2016).

12 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Aortic valve flow comparison between symmetric and asymmetric valve motion", in *Proceedings of JSME 27th Conference on Frontiers in Bioengineering*, Sapporo, Japan, (2016).

13 H. Uchikawa, T. Sasaki, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Periodicity studies in pulsating-arterial-flow computational analysis with smooth geometries and high-fidelity boundary-layer representation", in *Proceedings of the 21st Japan Society for Computational Engineering and Science Conference*, Niigata, Japan, (2016).

14 H. Uchikawa, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "A space–time refinement study of the aorta fluid mechanics computations", in *Proceedings of JSME 29th Comput. Mech. Division Conference*, Aichi, Japan, (2016).

15 H. Uchikawa, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Vortex structure and periodicity studies on aorta and aortic valve flow analysis", in *Proceedings of JSME 94th Fluids Engineering Conference*, Yamaguchi, Japan, (2016).

16 K. Shiozaki, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Computational analysis of aortic-valve fluid mechanics and experimental validation", in *Proceedings of the 30th Symposium on Computational Fluid Dynamics*, Tokyo, Japan, (2016).

17 **T. Terahara**, K. Shiozaki, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Heart valve flow analysis with isogeometric discretization and resolved jet flow near leaflet surfaces", in *Extended Abstracts of Mech. Eng. Congress 2017*, Saitama, Japan, (2017).

18 **T. Terahara**, T. Sasaki, K. Shiozaki, K. Takizawa, and T.E. Tezduyar, "Aortic valve analysis based on high-fidelity computational fluid dynamics", in *Proceedings of JSME 28th Conference on Frontiers in Bioengineering*, Tokushima, Japan, (2017).

19 **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Heart valve computational flow analysis with resolved jet flow near leaflet surface", in *Extended Abstracts of Research Committee on Blood Flow and Cardiovascular System*, Tokyo, Japan, (2017).

20 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Heart valve flow analysis with the integrated space–time variational multiscale, slip interface, and topology change methods and isogeometric discretization", in *Extended Abstracts of International Workshop on the Multi-Phase Flow; Analysis, Modeling and Numerics*, Tokyo, Japan, (2017).

21 K. Shiozaki, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Computational analysis and experimental validation of aortic valve fluid mechanics with experiment-based anatomical models", in *Proceedings of JSME 29th Bioengineering Conference*, Aichi, Japan, (2017).

22 K. Shiozaki, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Space–time isogeometric analysis of aortic-valve fluid mechanics and flow validation near the leaflet surfaces", in *Proceedings of the 22nd Japan Society for Computational Engineering and Science Conference*, Saitama, Japan, (2017).

23 K. Shiozaki, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Aortic valve and ST blood flow analysis", in *Proceedings of JSME 30th Comput. Mech. Division Conference*, Osaka, Japan, (2017).

24 K. Shiozaki, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Effect of aortic valve shape on flow", in *Proceedings of JSME 28th Conference on Frontiers in Bioengineering*, Tokushima, Japan, (2017).

25 A. Yoshida, T. Sasaki, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Estimation of zero-stress state in patient-specific aorta models with branches", in *Proceedings of JSME 29th Bioengineering Conference*, Aichi, Japan, (2017).

26 A. Yoshida, T. Sasaki, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Estimation of zero-stress state in patient-specific aorta models with branches", in *Proceedings of the 22nd Japan Society for Computational Engineering and Science Conference*, Saitama, Japan, (2017).

27 H. Uchikawa, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Fluid and structure analysis of the human aorta — fluid mechanics analysis with space-time isogeometric discretization —", in *Proceedings of the 22nd Japan Society for Computational Engineering and Science Conference*, Saitama, Japan, (2017).

28 H. Uchikawa, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "Patient-specific aorta flow analysis with the space–time VMS method and isogeometric discretization", in *Extended Abstracts of Mech. Eng. Congress 2017*, Saitama, Japan, (2017).

29 R. Kobayashi, **T. Terahara**, T. Sasaki, K. Takizawa, and T.E. Tezduyar, "A patient specific aortic valve analysis with resolved flow near the leaflet surfaces", in *Extended Abstracts of Mech. Eng. Congress 2018*, Osaka, Japan, (2018).

30 R. Kobayashi, **T. Terahara**, K. Shiozaki, K. Takizawa, and T.E. Tezduyar, "A patient specific aortic valve analysis with resolved flow near the leaflet surfaces", in *Proceedings of the 32th Symposium on Computational Fluid Dynamics*, Tokyo, Japan, (2018).

31 K. Shiozaki, **T. Terahara**, A. Tsushima, K. Takizawa, and T.E. Tezduyar, "Flow analysis of a left ventricle with mitral and aortic valves", in *Proceedings of JSME 31th Comput. Mech. Division Conference*, Tokushima, Japan, (2018).

32 **T. Terahara**, T. Sasaki, K. Shiozaki, K. Takizawa, and T.E. Tezduyar, "Flow and structure analysis of the aortic valve", in *Extended Abstracts of the 10th Research Committee on Blood Flow and Cardiovascular System*, Nagano, Japan, (2018).

33 K. Shiozaki, **T. Terahara**, A. Tsushima, K. Takizawa, and T.E. Tezduyar, "Flow analysis of a left ventricle with aortic valve", in *Extended Abstracts of the 11th Research Committee on Blood Flow and Cardiovascular System*, Tokyo, Japan, (2019).

34 M. Minamihara, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Mitral valve modeling with T-spline discretization", in *Proceedings of JSME 32th Comput. Mech. Division Conference*, Saitama, Japan, (2019).

35 R. Kobayashi, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Flow analysis of left ventricle with papillary muscle modeling", in *Proceedings of the 33th Symposium on Computational Fluid Dynamics*, Hokkaido, Japan, (2019).

36 **T. Terahara**, K. Shiozaki, R. Kobayashi, A. Tsushima, K. Takizawa, and T.E. Tezduyar, "Ventricle-valve-aorta flow analysis with the ST-SI-TC-IGA", in *Proceedings of the 24th Japan Society for Computational Engineering and Science Conference*, Saitama, Japan, (2019).

37 **T. Terahara**, K. Shiozaki, R. Kobayashi, A. Tsushima, K. Takizawa, and T.E. Tezduyar, "Space–time computational analysis of ventricle-valve-aorta flow", in *Proceedings of JSME 32th Comput. Mech. Division Conference*, Saitama, Japan, (2019).

38 K. Goto, **T. Terahara**, Y. Otoguro, K. Takizawa, and T.E. Tezduyar, "Extracting smooth surface from medical images: A method based on isogeometric discretization", in *Proceedings of the 25th Japan Society for Computational Engineering and Science Conference*, Online due to the COVID-19, (2020).

39 M. Minamihara, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Mitral valve leaflet and chorda tendineae connection modeling with T-splines", in *Proceedings of the 25th Japan Society for Computational Engineering and Science Conference*, Online due to the COVID-19, (2020).

40 M. Minamihara, N. Hiraoka, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Ventricle flow analysis with mitral valve", in *Proceedings of the 34th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2020).

41 A. Tsushima, K. Ishida, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Left ventricle flow analysis with the deformation based on myocardial fiber", in *Proceedings of the 34th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2020).

42 N. Hiraoka, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Ventricle-valve flow analysis with papillary muscles", in *Proceedings of the 34th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2020).

43 A. Suzuki, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "T-spline modeling of umbrella and flow analysis", in *Proceedings of the 34th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2020).

44 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Heart valve flow computation with the ST-VMS topology change method and isogeometric discretization: Effect of the leaflet thickness", in *Proceedings of the 25th Japan Society for Computational Engineering and Science Conference*, Online due to the COVID-19, (2020).

45 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Heart valve flow analysis with T-spline discretization", in *Proceedings of the 34th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2020).

46 M. Minamihara, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Ventricle flow analysis with the contact of mitral valve", in *Proceedings of the 26th Japan Society for Computational Engineering and Science Conference*, Online due to the COVID-19, (2021).

47 M. Minamihara, **T. Terahara**, Y. Taniguchi, K. Takizawa, and T.E. Tezduyar, "Computational analysis of mitral valve", in *Proceedings of JSME 34th Comput. Mech. Division Conference*, Online due to the COVID-19, (2021).

48 Y. Saito, Y. Otoguro, **T. Terahara**, K. Goto, K. Takizawa, and T.E. Tezduyar, "Extracting smooth surfaces from medical image: k-refinement and directional dependency", in *Proceedings of JSME 34th Comput. Mech. Division Conference*, Online due to the COVID-19, (2021).

49 T. Nakamura, **T. Terahara**, Y. Otoguro, K. Takizawa, and T.E. Tezduyar, "Red blood cell tracing near heart valve", in *Proceedings of JSME 34th Comput. Mech. Division Conference*, Online due to the COVID-19, (2021).

50 **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Heart valve flow analysis with leaflet contact and isogeometric discretization", in *Proceedings of the 26th Japan Society for Computational Engineering and Science Conference*, Online due to the COVID-19, (2021).

51 **T. Terahara**, A. Kitamura, K. Takizawa, and T.E. Tezduyar, "High-fidelity bioprosthetic heart valve flow analysis with t-spline discretization", in *Proceedings of the 27th Japan Society for Computational Engineering and Science Conference*, Akita, Japan, (2022).

52 T. Shirai, T. Tamai, T. Iino, R. Kubota, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Fundamental study of fluid–structure interaction considering contact with cloth", in *Proceedings of the 27th Japan Society for Computational Engineering and Science Conference*, Akita, Japan, (2022).

53 **T. Terahara**, A. Kitamura, K. Takizawa, and T.E. Tezduyar, "Left heart flow analysis with isogeometric discretization", in *Proceedings of JSME 34th Bioengineering Conference*, Fukuoka, Japan, (2022).

54 T. Shirai, Y. Taniguchi, **T. Terahara**, R. Kubota, K. Takizawa, and T.E. Tezduyar, "Contact structure analysis and fluid analysis for tracking the behavior of fabric in turbomachinery", in *Proceedings of JSME 35th Comput. Mech. Division Conference*, Online due to the COVID-19, (2022).

55 T. Shirai, **T. Terahara**, Y. Taniguchi, R. Kubota, K. Takizawa, and T.E. Tezduyar, "Computational flow analysis of a cloth contacting on a wall", in *Proceedings of the 36th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2022).

56 A. Suzuki, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Umbrella design and flow analysis with t-splines", in *Proceedings of the 36th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2022).

57 S. Kamiya, S. Mikawa, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Effect on shock waves caused by distance between parachute and payload, and mach number", in *Proceedings of the 36th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2022).

58 S. Mikawa, S. Kamiya, **T. Terahara**, K. Takizawa, and T.E. Tezduyar, "Computational flow analysis of supersonic parachute with adaptive t-splines", in *Proceedings of the 36th Symposium on Computational Fluid Dynamics*, Online due to the COVID-19, (2022).

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