

# 2023년 가스/스팀터빈 분야 연구동향

강영석\*

## 1. 서 론

한국유체기계학회 논문집과 한국유체기계학회 하계/동계 학술대회에 투고된 논문을 집계하여 2023년 국내 가스/스팀터빈분야의 연구동향을 분석하였다.

표 1 2023년도 가스/스팀터빈 분야 논문 투고방법 별 논문 수

투고방법		논문 수
논문집 <sup>(1~12)</sup>		12
하계학술대회	특별세션 <sup>(13~28)</sup>	16
	일반세션 <sup>(29~43)</sup>	15
	포스터 <sup>(44,45)</sup>	2
동계학술대회	특별세션 <sup>(46~82)</sup>	37
	일반세션 <sup>(83~103)</sup>	21
	포스터 <sup>(104~107)</sup>	4
합 계		107

표 1의 논문의 투고방법에 따른 논문 수를 보면, 2023년에는 가스/스팀터빈 분야로 총 12편의 논문이 심사를 통과하여 학회 논문집 26권 1호~6호에 걸쳐 게재되었다. 2023년도 학회 학술지 활성화 사업에 힘입어 2022년보다 논문집 게재 편수가 증가하였고, 2023년에 심사 완료된 논문 중 다수의 논문이 2024년 논문집 투고를 대기하고 있어, 2024년에도 2023년에 논문 편수에 준하거나 이를 상회하는 논문이 가스/스팀터빈 분야의 논문으로 게재될 것으로 예상된다.

2023년 학술대회에서는 2022년 학술대회에 비해 논문 발표 수가 95편에서 107편으로 소폭 증가하였다. 또한 예년과 유사하게 동계학술대회에서 발표된 논문 수가 하계학술대회에서 발표된 논문 수보다 많은 것으로 나타났다. 동계학술대회에서는 총 62편의 논문이 발표되었는데, 이는 하계학술대회의 논문 수의 두 배에 해당한다. 이러한 경향으로 보아 많은 연구자들이 동계학술대회에서의 논문 발표를 선호하는 것으로 확인된다.

한편, 하계/동계학술대회에서 특별세션의 논문 수가 일반세션의 논문 수를 상회하는 것을 확인하였다. 학술대회의 활성화를 위해 다양한 특별세션의 구성이 필요하지만, 동시에

일반세션의 활성화를 위한 노력도 함께 이루어져야 할 것으로 보인다.

표 2에서 확인할 수 있듯이, 최근 3년간 가스/스팀터빈 분야의 논문 편수는 꾸준히 증가하는 경향을 보였다. 특히, ‘열전달 및 냉각’ 분야에는 예년과 같이 가장 많은 수의 논문이 투고되었으며, 이 분야에서의 연구 활동이 매우 활발하게 진행되고 있다는 것을 시사한다. 또한, ‘기술 및 현황 소개’ 분야의 논문 수도 30편으로 크게 증가했는데, 해당 논문들은 모두 학술대회에서 발표되었다.

표 2 연도별 분류 기준에 따른 논문 수

분류 기준	논문 수 (편)		
	2021년	2022년	2023년
유동장	20	22	10
열전달 및 냉각	26	26	39
시험평가 및 성능해석	15	24	28
기술 및 현황 소개	18	21	30
합계	79	93	107

## 2. 분야별 논문 동향

표 2에서 ‘유동장’ 분야로 분류된 논문은 아래와 같이 2가지 세부 주제로 총 10편이 투고되었다.

- 가스터빈 구성품 쉘 및 2차 유동
- 가스터빈 구성품 주유동 및 팁유동

주로 가스터빈 쉘, 압축기 및 터빈 내부 유동장, 터빈 팁 유동장에 대한 연구들이 포함되었다.

- 가스터빈 연소기
- 냉각계통이 포함된 가스터빈 시스템 해석
- 단위요소(내부냉각 및 막냉각) 별 냉각 열전달 특성
- 터빈 날개 단위의 열전달 특성
- 적층제조를 활용한 냉각터빈 요소 제작

\* 한국항공우주연구원 항공추진연구부(Korea Aerospace Research Institute, Aeropropulsion Research Division)

한편 항공용/발전용 가스터빈의 국산화 개발연구, 터빈기술특화연구센터를 포함한 대형 연구개발 프로젝트 등이 진행됨에 따라 상기 내용을 포함하는 ‘열전달 및 냉각’과 관련된 논문이 다수 게재/발표되었으며, 해당 논문 투고 추세는 당분간 이어질 것으로 예상된다.

- 가스터빈 시스템 성능해석
- 전산유체역학/구조해석
- 가스터빈 엔진/구성품 성능시험

이와 별개로 여러 가스터빈 개발 프로그램을 통해 진행되는 구성품 별 수치해석 및 성능시험을 통한 가스터빈 구성품의 ‘시험평가 및 성능해석’에 대한 연구개발 내용도 꾸준히 게재 발표되고 있다.

‘기술 및 현황 소개’로 분류된 논문에서는 항공용/발전용 가스터빈 국산화 개발 프로그램 소개 및 개발 현황, 암모니아/수소 연소, 적층제조 등과 같은 주제에 대한 기술개발 동향이 소개되었다. 해당 주제의 논문들이 발표된 세션들은 가스/스팀터빈 관련 연구자들의 주목을 받았으며, 해당 세션들은 해당 연구자들 간의 가장 큰 교류의 장으로 큰 성과를 이뤘다. 특별히, 가스/스팀터빈 연구기관에서 진행되는 연구개발 프로그램의 성과 발표회 등을 학술대회 특별세션을 통해 개최하는 사례가 증가하고 있었다. 이러한 동향에 따라 학술대회에서 특별세션 수가 증가하였음을 확인하였으며, 이러한 추세를 고려하여 향후 학술대회 구성 시에는 일반세션과 특별세션 간의 균형을 조절할 필요가 있을 것으로 보인다.

### 3. 결 론

2023년에는 한국유체기계학회 논문집과 하계 및 학술대회에서 투고된 논문을 분석하여 가스/스팀터빈 분야의 연구동향을 조망하였다. 2023년에는 2022년 대비 게재/발표된 논문 수가 양적으로도 증가하였으며, 주로 가스터빈 국산화 연구개발 과제로부터 다양한 기관에서 투고한 연구논문이 특정 주제에 편중되지 않고 게재/발표되었음을 확인하였다. 한편 연도별 논문 제목을 분석한 결과, 최근 한국유체기계학회에서 가스/스팀터빈 분야에서 다수의 연구논문들이 주제의 연속성을 가지고 매 학술대회마다 발표되고 있는 추세임을 확인하였다. 이러한 추세를 유지하기 위해서는 학회 혹은 분과 차원에서 산학연 연구계에 대한 지원이 필요하다고 판단된다.

### References

(1) Lim, H, Choi, B., Park, M., Hwang, S., Park, J., Seo, J.,

Bang, J. Kim, S., Lim, Y., Park, S., and Jeong, H., 2023, “Development of Supercritical Organic Rankine Cycle Turbine for Waste Heat Power Generation,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 1, pp. 5~16.

(2) Lee, D., Chung, H., Kang, Y. S., and Rhee, D. H., 2023, “A Study on the Implementation of a Micro Turbojet Integrated Analysis Model for Predicting Engine Performances for Various Operating Conditions,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 2, pp. 5~15.

(3) Lee, G., Lee, K. M., 2023, “A Study on Turbulence Intensity Characterization of the Low Swirl Flame Developed in Hybrid Fractal Grid,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 2, pp. 25~35.

(4) Hwang, Y., Kim, S., Lee, D., Rhee, D. H., Chung, H., and Kang, Y. S., 2023, “Research of Turbofan Engine Derived from Micro Turbojet Engine,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 2, pp. 36~42.

(5) Lim, W. S., Lee, D. H., Lee, A. H., Jo, Y. R., Kang, M. S., Jeong, J. Y., and Kwak, J. S., 2023, “Comparison of the Transient IR Camera and the PSP Techniques in Film Cooling Effectiveness Measurement,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 3, pp. 15~22.

(6) Lee, K. T., Yang, H. M., Lee, S. S., Kang, M. S., Kim, G. M., and Kwak, J. S., 2023, “Effects of Slot Width and Injection Angle of the Inclined Slot on the Film Cooling Effectiveness of a Flat Plate,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 3, pp. 13~20.

(7) Kang, Y. S., Chung, H., Rhee, D. H., Son, K., Shaun Kim, Lim, B., Ahn, C., and Lee, B., 2023, “Conjugate Heat Transfer Analysis for 1.5 Stage High-Pressure Turbine,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 4, pp. 21~28.

(8) Jung, J. W., Hwang, S. H., Kim, T. H., Kim, E., and Ha, J. W., 2023, “Leakage Measurements of Labyrinth Seal, Brush Seal, and Radial Film Riding Face Seal,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 4, pp. 29~37.

(9) Kwon, J. W., and Ahn, J., 2023, “A Study on the One-dimensional Design Equation of a Stepped Labyrinth Seal,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 5, pp. 53~60.

(10) Park, G. S., Hur, M. S., Kim, T. S., Kim, D. H., and Jung, I. Y., 2023, “Prediction of Honeycomb Labyrinth Seal Performance Using CFD and Artificial Neural Network,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 5, pp. 61~71.

(11) Chung, H., Rhee, D. H., Kang, Y. S., Ahn, C., Lim, B., and Seo, J., 2023, “Similarity Testing for Cooling Performance Assessment in the 1st Stage Turbine Vane of a Turbohaft Engine,” *The KSFJ Journal of Fluid Machinery*, Vol. 26, No. 6, pp. 7~15.

(12) Park, J., Kim, J., and Kang, C., 2023, “The Influence of the Length-To-Diameter Ratio on Film Cooling Performance for

- a Cylindrical Hole with an Inlet Groove,” *The KSFM Journal of Fluid Machinery*, Vol. 26, No. 6, pp. 79~89.
- (13) Kang, Y. S., Lee, D., Hwang, Y., Kim, S., Chung, H., and Rhee, D-H., 2023, “Application of Micro Gas Turbine Engines to UAVs,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (14) Kang, Y. S., Lee, D., Lee, B. J., Rhee, D-H., Lee, Y-J., Yang, I., and Lee, K-J., 2023, “Application of Micro Gas Turbine Engine to Scaled TBCC Engine,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (15) Lee, D., Kim, S., Hwang, Y., Kang, Y. S., and Rhee, D-H., 2023, “A Study of Afterburner for the Development of Micro Gas Turbine for High-Speed Propulsion,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (16) Hwnag, Y., Kim, S., Lee, D., Rhee, D-H., Chung, H., and Kang, Y. S., 2023, “Conceptual Design of Low-Bypass Micro Turbofan Engine for High-Speed, High-Efficiency Propulsion,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (17) Kim, J., Kim, S., Lee, T., Kim, M., Kwon, H., Cheon, H., and Lee, E., 2023, “1500° C Gas turbine Hot gas Path Part Re-engineering and Part Manufacturing Technology,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (18) Lim, S-H., 2023, “Research on the Development of Gas Turbine Materials and Components Quality Evaluation and Performance Verification Platform,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (19) Lee, C., 2023, “Manufacturing Technology Advancement for Mass Production of Gas Turbine Hot-Section Components and Technology Development to Strengthen Supply Chain Capabilities,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (20) Byun, S. S., 2023, “Localization of Film Riding Type Seal to Improve the Efficiency of the Secondary Air system for Large Gas Turbines,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (21) Park, J., Choi, N., Park, S., Park, S., Kwon, K., Lee, D., and Yoon, Y., 2023, “150MW(F-Clas) Gas Turbine Hydrogen Co-firing Retrofit Technology Development and Demonstration,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (22) Kim, M., Hwang, J., Kang, D-W., Lee, W-J., Min, K-W., Cho, J-H., and Kim, H-S., 2023, “Development of Eco-friendly Combustor for 300MWe-class GT with 50% Hydrogen Co-firing,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (23) Song, B., 2023, “Development and Demonstration of Ammonia 20% Co-firing Technology for Carbon-Free Fuel Conversion,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (24) Kim, D., 2023, “Development and Demonstration of Ammonia 20% Co-combustion Technology for Power Generation CFD Boilers,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (25) Ko, M., 2023, “GT Hot Parts Design and Manufacturing Process,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (26) Nam, S., 2023, “Gimpo CHP Site Verification Status of DGT6-300H S1 Model,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (27) Kim, K., 2023, “Introduction of the National Project of H-Class Hydrogen GT Technology Development and Demonstration,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (28) Chung, J., 2023, “GT Compressor Transonic Blade Design and Flutter Test Verification,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (29) Park, H. S., Jeong, J. H., and Kim, T. S., 2023, “Performance Analysis of Hydrogen Mixed Gas Turbine Combined Power System according to Operation Scenario,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (30) Jo, Y. R., Jeong, J. Y., Kim, W., and Kwak J. S., 2023, “Superposition Effect of the Fan-Shaped Film Cooling Hole on a Gas Turbine,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (31) Kim, D., Kwon, H., and Park, H., 2023, “Experimental Study of the Effect of Diffuser Shape on Double Wall Cooling Structure,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (32) Lee, G., and Lee, K., 2023, “An Experimental Study on the Effect of Turbulence Generating Plate on Low Swirl Flames,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (33) Ahn, J., Ahn, S., and Son, I., 2023, “Localization of Material for Aircraft Gas Turbine Engines,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (34) Chung, H., Rhee, D-H., Ahn, C., Lim, B., Lee, B., and Seo, J-B., 2023, “Cooling Performance Measurement of 2nd Stage Turbine Vane in Turboshaft Engine,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (35) Rhee, D-H., Chung, H., Ahn, C., Nho, Y., and Seo, J-B., 2023, “A Feasibility Study of Thermal Paint on Turboshaft Engine Gas Generator Turbine Cooling Performance Similarity Tests,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (36) Bang, M., and Cho, H. H., 2023, “Analysis of Cooling Performance in Gas Turbine Blade Tip with Various Slot Locations,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (37) Lim, B. W., Park, K. S., Chung, J. T., and Kwak, J. S., 2023, “Effect of Fan-shaped Cooling Hole Geometry on Film Cooling Performance at a Partial Cavity Tip,” *Proceedings of the KSFM 2023 Summer Annual Meeting*.
  - (38) Park, G. S., Hur, M. S., Kim, T. S., Kim, D. H., and Jung, I.

- Y., 2023, "Prediction of Labyrinth Seal Performance using Neural Network Based on Computational Analysis," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (39) Kim, N. K., Hwang, S. H., Kim, T. H., Hwang, S. H., Kang, K., and Kim, E., 2023, "Effect of Journal Eccentricity and Oil Supply Pressure on Damping Coefficient of Squeeze Film Damper with Open Ends and Piston Ring Seal Ends," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (40) Kwon, J. W., and Ahn, J., 2023, "A Study on the Design Equation of a Stepped Labyrinth Seal," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (41) Lee, H., Han, J., Han, K., and Hwang, W., 2023, "3D Flow Structure Examination within a Gas Turbine Blade Lattice Cooling Channel," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (42) Choi, S., Lee, S., Na, J. Y., Lee, H. J., Park, H. S., and Cho, H. H., 2023, "Local Heat and Mass Transfer in Rotor-Stator System with Radially Positioned Multiple Impingement Jet," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (43) Park, H. S., Lee, H. J., Lee, J., Choi, S., Kim, J., and Cho, H. H., 2023, "Cooling Performance and Exit Profile of High-Pressure Turbine Nozzle for Turbofan Engine," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (44) Kim, S., Lee, D., Hwang, Y., Jung, S., Rhee, D-H., and Kang, Y. S., 2023, "Experimental Study on Film Cooling Characteristics in High Pressure Turbine according to Cooling Hole Arrangement and Configurations," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (45) Jeong, J. Y., Jo, Y. R., Lim, W. S., and Kwak, J. S., 2023, "Film Cooling Effectiveness of Butterfly-Shaped Hole Configuration on a Gas Turbine Vane," Proceedings of the KSFM 2023 Summer Annual Meeting.
- (46) Ma, S. B., Choi, J., and Park, T. C., 2023, "Experimental and Numerical Aerodynamic Analysis of a Multi-Stage Centrifugal Compressor with Casing Treatment," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (47) Park, H., Lee, S., Park, Y., Lee, J., and Na, S., 2023, "Design and Manufacturing Process of a Test Rig for a Two-Stage Centrifugal Compressor for a 1,000 HP Class Turboshift Engine," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (48) Park, T. C., Lim, B., Cha, B. J., Kang, Y. S., Rhee, D-H., Lee J. S., and Ahn, C., 2023, "Experimental Study on Performance of 2-Stage Centrifugal Compressor for 1000 shp-class Turboshift Engine, Part I-Aerodynamic Performance," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (49) Lim, B., Park, T. C., Cha, B. J., Kang, Y. S., Rhee, D-H., Lee J. S., and Ahn, C., 2023, "Experimental Study on Performance of 2-stage Centrifugal Compressor for 1000 shp-class Turboshift Engine, Part-II Surge Characteristic," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (50) Kim, G., Park, Y. K., Kim, J. H., Cho, J. Y., and Kim, T. S., 2023, "Gas Turbine Blade Reengineering and Design of Integrated Platform," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (51) Kim, S., Yoon, S., Park, Y., Ha, M., and Min, J., 2023, "Research on Improving Gas turbine Cooling Performance using Lattice Structure Rib Shape," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (52) Oh, J., Lim, W. S., and Kwak, J. S., 2023, "Rotating Experiment for Heat Transfer Measurement of Gas Turbine Blade's Internal Cooling Chan," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (53) Yun, B. G., Ju, S. R., Han, M. G., and Lee, S. M., 2023, "Development of Gas Turbine Blade Manufacturing Technology using 3D Printing Hybrid Investment Casting," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (54) Kim, J., 2023, "Doosan Enerbility Gas Turbine New Technology Trend," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (55) Kim, M., 2023, "Demonstration Status of H-Class High Efficiency Gas Turbine," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (56) Nam, S., 2023, "Current Footprint of DGT6-300H S2 (+1600° C) Validation Test," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (57) Baek, S., 2023, "Monitoring Sensor Probe and Alarm Limit Set Up Method for Gas Turbine Compressor Blade," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (58) Iurii Goroshchak, 2023, "Innovative Approaches to Reverse Engineering Heavy-Duty Gas Turbines," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (59) Lee, S. Y., Cho, K. Y., Lim, Y. M., Ryu, D. H., and Han, M. H., 2023, "Development of SiC Fiber Reinforced Ceramic Composite for Aviation Power Generation," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (60) Kim, W. J., Song, Y., Kim, D., Lee, H. G., and Park, J. Y., 2023, "Fabrication and Properties of Vane Airfoil SiC Composites by CVI Method," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (61) Kim, S. H., Kim, S., Han, I. S., Bang, H. J., Seong, Y. H., and Lee, S., 2023, "Development of SiC<sub>f</sub>/SiC composites based on LSI process for Gas Turbine Hot Section Part," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (62) Moon, H. S., Kim, J. Y., Kim, S. W., and Lee, K. S., 2023, "SiC Reinforced Ceramic Composite Ceramic Coating Developed to Improve Performance," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (63) Kim, S., Choi, J. H., Nam, M. S., and Oh, Y. S., 2023, "Fabrication and Characterization of Rare-earth Silicates for Environmental Barrier Coating Applications," Proceedings of

- the KSFM 2023 Winter Annual Meeting.
- (64) Cho, H. H., 2023, "Development of High-Efficiency Gas Turbine Technologies for UAV," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (65) Kim, W., Jeong, J. Y., Kang, Y. J., Kwak, J. S., Park, K. S., Lim, B. J. and Chung, J. T., 2023, "Tip Cooling Performance on Gas Turbine Blade Internal Cavity Geometry," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (66) Choi, J., Lee, J., Im, J. H., and Choi, J. I., 2023, "Numerical Study of Heat Transfer and Film Cooling in Transonic Annular Cascade," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (67) Park, S. M., Kim, J. H., Choi, W. W., and Kim, S. M., 2023, "Study on Heat Transfer Characteristics of Impingement/Effusion Cooling System with Circular Pin Fins," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (68) Lee, J., Park, H. S., Lee, H. J., Na, J., Im, J. H., and Cho, H. H., 2023, "Heat Load Reduction Design on the Gas Turbine Nozzle Endwall Considering Off-Design Operating Condition," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (69) Jo, S., and Hwang, W., 2023, "Effects of Turbine Blade Tip Geometry on Flow Field and Aerodynamic Performance," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (70) Hong, D., Kim, M., and Song, S. J., 2023, "Reduction of Mixing Loss due to Casing-side Secondary Air and Main Flow in Linear Turbine Cascade," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (71) Na, J. Y., Park, H. S., Lee, H. J., Lee, J. Cho, M., and Cho, H. H., 2023, "Analysis of Sealing Performance for Cross Flow Geometry in Gas Turbine Rim-Seal," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (72) Song, W., Kim, K., and Kim, W., 2023, "The Effect of Heat Treatment on Thermophysical Properties of Superalloy CMSX-4," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (73) Cho, H. H., 2023, "Development of Gas Turbine Hot Components Using Metal Additive Manufacturing," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (74) Kim, B., Lee, D., Son, I., and Ahn, J., 2023, "Additive Material Database Development for Aircraft Gas Turbine Engine," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (75) Koo, J., Park, H., Seong, M., Park, E., Park, S., and Kim, N., 2023, "Influence of the Hot Isostatic Pressing Treatment on the Different Crack Modes of Additively Manufactured CM247LC," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (76) Kim, M., Oh, T., Kim, J., and Jang, B., 2023, "Prototype Production of Gas Turbine Vane Parts for Power Generation by Additive Manufacturing," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (77) Song, H. S., Heo, J., Kim, T., Park, H. S., and Cho, H. H., 2023, "Measurement of Pressure Drop Characteristics of Internal Cooling Passages of Gas Turbine Vane using Metal Additive Manufacturing," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (78) Cho, S., and Ko, K., 2023, "Integrated Layout Design for Turboshaft Engine," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (79) Kim, J., Shaun Kim, Kwak, S., Ku, J., Ahn, C., Kim, H., Kim, J., Lee, S., Lee, D. H., and Seo, J. B., 2023, "Design, Simulation, and Test of Korean Turboshaft Engine Combustor," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (80) Son, K., and Lee, J., 2023, "A Study on Meanline Design Optimization Method of Multi-Stage Axial Turbine using Multi-Objective Genetic Algorithm," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (81) Min, D., Ju, Y., Son, I., and Ahn, J., 2023, "Design of Requirement for Single Crystal/Equiaxed Grain Casting of Turbo Shaft Engine," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (82) Chung, H., Rhee, D. H., Kang, Y. S., Ahn, C., Nho, Y. C., Lim, B., and Seo, J. B., 2023, "Cooling Performance Test and Evaluation of Gas Generator Turbine in 1,000SHP class Turboshaft Engine for Unmanned Compound Rotorcraft," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (83) Lee, D., Chung, H. Kang, Y. S., and Rhee, D. H., 2023, "Research on Improvement of Micro Turbojet Integrated Analysis Model by Applying Secondary Flow," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (84) Lee, H. T., Park, Y. K., Kim, J. S., Kim, T. S., and Kang, D. W., 2023, "A Methodology for Compressor Performance Map Generation based on Operation Data," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (85) Park, Y. K., and Kim, T. S., 2023, "A Study on Modification of the Temperature Control Curve of Power Generation Gas Turbine using Thermodynamic Models," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (86) Jeong, Y., Baek, S. I., and Ryu, J., 2023, "Combined Effect of Mist Diameter and Mainstream Turbulence Intensity in Mist-Assisted Film Cooling," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (87) Kim, S. R., Park, H. S., Jeong, J. H., and Kim, T. S., 2023, "Performance Analysis of Gas Turbine Combined Cycle System with Co-firing of Natural gas/Ammonia/Hydrogen Fuel Blends," Proceedings of the KSFM 2023 Winter Annual Meeting.
- (88) Kang, H. S., Kim, D. S., Chang, S. Y., Kim, D. H., Lee, S. M., Shin, J. G., Kim, D. G., Park, G. S., and Joo, M. L., 2023, "Development of Standard Gas Turbine Combined Cycle

- Power Plant Operation Optimization Solution,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (89) Park, G. S., Joo, M. L., Kang, H. S., Chang, S. Y., Kim, D. G., and Kim, D. S., 2023, “Development of Gas Turbine Partial Load Expected Performance Prediction Solution,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (90) Joo, M. L., Kang, H. S., Park, G. S., Chang, S. Y., Kim, D. S., Lee, J. H., and Park, Y. S., 2023, “Development of Standard Gas Turbine Combined Cycle Power Plant Power Output Prediction Solution,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (91) Kim, D. H., Chang, S. Y., Kang, H. S., Park, G. S., Joo, M. L., and Kim, D. S., 2023, “Development of Web-based Gas Turbine Vibration Monitoring and Analysis System,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (92) Lee, K., 2023, “The Role of Gas Turbines in Achieving Nationally Determined Contributions (NDC),” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (93) Lee, H. K., Song, I., Jung, J., and Ryu, J., 2023, “Numerical Study on Influence of Coolant Flow Rate on Heat Transfer in High-Temperature Blades,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (94) Lee, H., Shin, J. H., and Kim, D. J., 2023, “Study on the Soot Deposition Effect of the Supersonic Impulse Turbine Performance for the Turbopump,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (95) Kim, G., Park, H. S., Lee, H. J., Kim, Y., Park, S. H., and Cho, H. H., 2023, “Heat Transfer Characteristics of Pin-Fin with Guide Rib,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (96) Moon, H. K., 2023, “Differences Between Heavy Frame, Industrial Gas Turbine and Aero (Jet) Engine Designs,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (97) Kim, Y., Lee, H. J., Kim, T., Kim, S., and Cho, H. H., 2023, “Flow and Heat Transfer Characteristics with Advanced Structure of Impingement Jet Plate in Impingement/Effusion Cooling,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (98) Kim, J. H., and Kang, C. W., 2023, “Effects of Cross-Sectional Shape of an Inlet Groove on Film Cooling Performance,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (99) Lee, S., and Park, S., 2023, “A Research on Technology Elements of Aviation Hydrogen Gas Turbines,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (100) Ock, S., and Park, S., 2023, “Principle of Micromix Combustors and a Design of a Pure Hydrogen Combustor for Research,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (101) Kwon, H., Kim, D., and Park, H., 2023, “Numerical Study on Aerodynamic Loss and Entropy Generation by Applying Compound Angle for Effusion Hole,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (102) Pi, Y. H., and Park, J. S., 2023, “Comparison of Creep Life according to Cooling Flow Rate in Gas Turbine Blades,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (103) Van-Hoang Nguyen, Tai-Duy Vu, Cong-Truong Dinh, and Park, S. G., 2023, “Numerical Analysis of Flow Dynamics and Thermal Performance in Gas Turbine Blade Cooling Channels Including Separated Ribs,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (104) Park, J., Kim, J., and Kang, C. W., 2023, “Effect of Length of Laidback Fan-Shaped Hole with an Inlet Groove on Film Cooling Performance,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (105) Kim, D., Kwon, H., and Park, H., 2023, “Improving Heat Transfer and Cooling Efficiency of Gas Turbine System through Hybrid Cooling,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (106) Son, J., Sajjan Tamang, and Park, H., 2023, “Study on the Flow Characteristics in a Cooling Channel using Rib Turbulator,” Proceedings of the KSFM 2023 Winter Annual Meeting.
- (107) An, J. S., Kim, G. M., and Kwak, J. S., 2023, “Experimental Investigation on the Effect of Width and Inclined Angle of the Film Cooling Slot in the Behavior of Film Cooling Fluid,” Proceedings of the KSFM 2023 Winter Annual Meeting.