Woensug Choi

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PROFILE

- Highly self-motivated Ph.D. candidate with demonstrated research expertise analysis of flow-induced noise and vibration incorporating CFD calculations. Strong interpersonal skills and research project managements.
- Rich experience in modeling and simulating using OpenFOAM and in-house aeroacoustics, structure solver modules.
- Strong adaptation to different programming languages. (First learned Visual Basic programming at age of 9)
- Language: Fluent in Korean (Native), English (Graduated middle school in San Antonio, Texas, USA), and Japanese.
- US residency experience : 9th grade at Rogers high school, Newport, RI (3 years grade skipping at age of 13)
- Member of a military family
  - Father : former submarine captain and naval attaché to USA retired as a rear admiral at Republic of Korea Navy.
  - Brother : Served Republic of Korea Marine Corps
  - Myself : Served as Technical Research Personnel for Republic of Korea Army

EDUCATION

Mar. 2013 ~ Present	**Seoul National University** (Integrated Ph.D. Program)	Seoul, Korea
	Department of Naval Architecture and Ocean Engineering, Ship Noise and Vibration Laboratory	

Thesis: Development of numerical analysis methods for flow-induced noise due to turbulent flows around underwater structures
Advisor: Prof. Suk-Yoon Hong
Ph.D. Candidate expected to graduate in Feb. 2020

Mar. 2009 ~ Feb. 2013	**Yokohama National University** (Korea-Japan Joint Government Scholarship Program)	Yokohama, Japan
	Department of Mechanical Engineering and Materials Science, Digital Engineering Laboratory	

Thesis: Constrained B-spline surface fitting by iterative geometric approximation algorithm
Advisor: Prof. Takashi Maekawa
Bachelor of Science in Mechanical Engineering and Materials Science (Machine processing course)

RESEARCH INTEREST

- **Computational aeroacoustics/hydroacoustics**
  - ✓ Modeling and simulation of flow-induced noise and vibration
  - ✓ Turbulence models of computational fluid dynamics and application of computational acoustics
- **Fluid-structure interaction analysis**
  - ✓ Predictions of vibration and noise excited by turbulent boundary layers and turbulent flows
  - ✓ Simulation of flow-induced resonance behavior such as frequency lock-in phenomenon and safety boundaries.

RESEARCH EXPERIENCES

- **Researcher (PM)** – *Department of vibrational response prediction methods for underwater*   Mar. 2019 ~ Present
  structures excited by wake considering fluid-structure interactions (Funded by Hyundai Heavy Industries)
  - ✓ Development of prediction methods for vibrational response of self-excited lifting bodies with hybrid coupling FSI analysis to simulate frequency lock-in and effect of trailing edge designs to its characteristics.

- **Researcher (PM)** – *Future Submarine Low Noise Propeller Specialized Laboratory*   Oct. 2018 ~ Present
  (With Korea Research Institute of Ships & Ocean Engineering funded by Agency for Defense Development)
  - ✓ Broadband noise predictions of marine propellers induced by turbulent boundary layer using wall pressure spectrum models with available RANS CFD results.

- **Researcher (PM)** – *Research on engineering requirements of next generation advanced*   April. 2018 ~ Dec. 2018
  navy ships and acquisition considerations for core equipment
  (With Daewoo Shipbuilding and Marine Engineering funded by Republic of Korea Navy)
  - ✓ Conceptual design calculation methods development and literature research for future advanced navy ship equipment requirements including acquisition consideration and planning.

- **Researcher (PM)** – *Research on technical counterplans for future propulsion systems*   Aug. 2017 ~ Dec. 2017
  (Funded by Republic of Korea Navy)
  - ✓ Conceptual design calculation methods development and literature research for future propulsion systems including pump-jet propulsions and noise attenuations at sea.

- **Researcher** – *Development of performance assessment methods for perforated noise*   Aug. 2017 ~ Dec. 2017
  absorption structures in high flow environments (Funded by Hyundai Electronics)
  - ✓ Estimation of noise produced by perforated structures in flow environments

- **Researcher (PM, Representative)** – *Advanced Naval Vessels Research Laboratory*   June. 2013 ~ Dec. 2017
  (Funded by Agency for Defense Development and Daewoo Shipbuilding and Marine Engineering)
  - ✓ Turbulence-induced noise analysis of ship appendages using acoustic analogy and turbulent boundary layer excited vibro-acoustic response analysis for ship hull designs using empirical wall pressure spectrum models and Energy flow analysis methods.

- **Researcher** – *Underwater self-noise analysis modeling and measurements*   June. 2014 ~ June. 2015
  (Funded by Agency for Defense Development)
  - ✓ Calculation of flow-induced noise generated at the head of torpedoes

PUBLICATIONS

1. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, J.-H Choi, S.-G. Lee, I.-R. Park, H.-S. Seol, and M.-J. Kim, "Time domain predictions of broadband trailing edge noise using wall pressure spectrum models for marine propellers", *in preparation.*

2. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, J.-H, "Numerical simulation of lock-in phenomenon and using hybrid-coupling fluid-structure interaction analysis methods for rudder designs", *in preparation.*

3. **W. –S. Choi**, S. -Y. Hong, H.-W. Kwon, J.-W. Seo, S.-H. Rhee, and J.-H. Song, "Estimation of turbulent boundary layer induced noise using energy flow analysis for ship hull designs", *Journal of Engineering for the Maritime Environment*, **234**, 1, 196-208, (2020). **SCI**

4. **W. –S. Choi**, S. -J. Jeong, S.-Y. Hong, J.-H. Song, H.-W. Kwon, and M.-J. Kim, "Predictions of Broadband Noise for non-cavitation hydrofoils using wall pressure spectrum models", **25**, 6, 765-771, (2019). KCI, In Korean.

5. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, J.-W. Seo, and S.-H. Rhee, "Analysis of hull-induced flow noise characteristics for wave-piercing hull forms", *Journal of the Korean Society of Maritime Environment & Safety*, **24**, 5, 619-627, (2018). KCI, In Korean

6. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "Prediction of turbulent boundary layer noise on plate using energy flow analysis", *Transactions of the Korean Society for Noise and Vibration Engineering*, **27**, 5, 608-615, (2017). KCI, In Korean

7. Y.-S. Choi, **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, H.-S. Seol, and C.-M. Jung, "Development of formulation Q1As method for quadrupole noise prediction around a submerged cylinder", *International Journal of Naval Architecture and Ocean Engineering*, **9**, 5, 484-491, (2017). **SCI**

8. **W. –S. Choi**, Y.-S. Choi, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and H.-S. Seol, "Experimental investigation of noise generated by submerged circular cylinder", *Noise Control Engineering Journal*, **65**, 4, 288-294, (2017). **SCI**

9. **W. –S. Choi**, Y.-S. Choi, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "Turbulent-induced noise of a submerged cylinder using a permeable FW-H method", *International Journal of Naval Architecture and Ocean Engineering*, **8**, 3, 235-242, (2016). **SCI**

10. J.-Y. Kim, **W. –S. Choi**, S. -Y. Hong, H.-G. Chung, J.-H. Song, W.-S. Im, and H.-W. Kwon, "A Study on Efficient Test & Evaluation Methods in Naval Ship Acquisitions", *Journal of the Korea Institute of Military Science and Technology*, **19**, 6, 703-711, (2016). KCI, In Korean

11. Y.-S. Choi, S. -Y. Hong, J.-H. Song, H.-W. Kwon, **W. –S. Choi**, and C.-M. Jung, "Turbulent-induced noise of 2-dimensional sonar dome shaped structure", *Transactions of the Korean Society for Noise and Vibration Engineering*, **26**, 1, 39-48, (2016). KCI, In Korean

12. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "Turbulent-induced noise around a circular cylinder using permeable FW-H methods", *Journal of the Korean Society of Marine Environment & Safety*, **20**, 6, 752-759, (2014). KCI, In Korean

INTERNATIONAL CONFERENCES (FIRST AUTHOR LIST ONLY)

1. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, and H.-W. Kwon, "Turbulent boundary layer noise analysis using energy flow analysis", NOVEM2018, Ibiza, Spain, (2018) – oral.

2. **W. –S. Choi**, S. -Y. Hong, T.-G. Kim, Y. Choi, J.-H. Song, and H.-W Kwon, "Turbulent-induced noise of underwater submerged bodies for hydrodynamic design", IMDC2015, Tokyo, Japan, (2015) – oral.

3. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "Turbulent-induced noise around a circular cylinder using permeable FW-H methods", NAA2015, Shanghai, China, (2015) – oral.

DOMESTIC CONFERENCES (FIRST AUTHOR LIST ONLY)

1. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, J.-H Choi, S.-G. Lee, I.-R. Park, H.-S. Seol, and M.-J. Kim, "Predictions of non-cavitation broadband noise for underwater propellers", KSNVE2019, Jeju, Korea (2019) – oral.

2. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, M.-J. Kim, and K.-C. Lee, "Numerical study on non-cavitation broadband noise for hydrofoil", KIMST2018, Daejeon, Korea (2018) – oral.

3. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "Turbulent-induced noise prediction methods for high-speed future naval ships", KIMST2017, Daejeon, Korea (2017) – oral.

4. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "A study on characteristics of turbulent boundary layer noise using fluid-structure interaction analysis", KSNVE2017, Kwangju, Korea (2017) – oral.

5. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and C.-M. Jung, "Characteristics of turbulent-induced noise for naval ship appendages", KSOE2014, Busan, Korea (2014) – oral.

6. **W. –S. Choi**, S. -Y. Hong, J.-H. Song, H.-W. Kwon, and Y.-L. Jung, "Turbulent-induced noise for underwater submerged bodies", KSOE2014, Busan, Korea (2014) – oral.

MAJOR COURSES

- Engineering Acoustics
- Ship Noise and Vibration Measurements and Analysis
- Fundamentals of Underwater Acoustics
- Noise Control Engineering
- Turbulent Flows
- Advanced Computational Fluid Dynamics (Discretizations of Compressible Euler and Navier-Stokes Eqn.)
- Advanced Computational Fluid Dynamics (Basic Elements and Scalar Conservation Laws)
- Numerical Analysis in Mechanical Engineering
- Computational Fluid Dynamics for Turbulent Ship Flows