

CURRICULUM VITAE

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EDUCATION

Pohang University of Science and Technology (POSTECH) Pohang, Korea. Ph.D, Mechanical Engineering	2015
Pohang University of Science and Technology (POSTECH) BS, Mechanical Engineering	Pohang, Korea. 2008

PROFESSIONAL APPOINTMENT

Kangwon National University, Korea Assistant professor	2017. Sep - Present
Linköping university, Linköping, Sweden Postdoctoral Fellow	2016. March - Present
POSTECH Biotec Center, Pohang, Korea Postdoctoral Fellow	2015–2016

RESEARCH FIELD

Development of 4D Flow MRI for diagnosis of cardiovascular disease (based on fluid-dynamics)

- Development of turbulence tensor mapping with 4D Flow MRI
- Application of turbulence tensor for diagnosis of flow related hemolysis
- Application of turbulence tensor for predicting irreversible pressure drop through stenosis

Development of hemodynamic indices for diagnosis of cardiovascular disease

- Wall shear stress analysis in patients with aortic stenosis
- Fluid-dynamic analysis of blood flow with aortic valve stenosis using 4D Flow MRI
- Development of patient-specific in-vitro phantom for the fluid-dynamic studies

Experimental analysis on the hemodynamic characteristics using Particle Image Velocimetry

- Experimental analysis swirling flow in a stenosis using particle image velocimetry
- Fluid-dynamic advantages of swirling flow in vascular graft

RECENT PEER-REVIEWED PUBLICATION

Ha, H., Kvitting, J.P., Dyverfeldt, P. and Ebbers, T., 2019. Validation of pressure drop assessment using 4D flow MRI-based turbulence production in various shapes of aortic stenoses. *Magnetic resonance in medicine*, 81(2), pp.893-906.

Ha, H., Kvitting, J.P.E., Dyverfeldt, P. and Ebbers, T., 2019. 4D Flow MRI quantification of blood flow patterns, turbulence and pressure drop in normal and stenotic prosthetic heart valves. *Magnetic resonance imaging*, 55, pp.118-127.

Ha, H., Koo, H.J., Huh, H.K., Kim, G.B., Kweon, J., Kim, N., Kim, Y.H., Kang, J.W., Lim, T.H., Song, J.K. and Lee, S.J., 2018. Effect of pannus formation on the prosthetic heart valve: In vitro demonstration using particle image velocimetry. *PloS one*, 13(6), p.e0199792.

Koo, H.J., **Ha, H.**, Kang, J.W., Kim, J.A., Song, J.K., Kim, H.J., Lim, T.H. and Yang, D.H., 2018. Impact of pannus formation on hemodynamic dysfunction of prosthetic aortic valve: pannus extent and its relationship to prosthetic valve motion and degree of stenosis. *Clinical Research in Cardiology*, pp.1-11.

Ha, H., Ziegler, M., Welander, M., Bjarnegård, N., Carlhäll, C.J., Lindenberger, M., Länne, T., Ebbers, T. and Dyverfeldt, P., 2018. Age-Related Vascular Changes Affect Turbulence in Aortic Blood Flow. *Frontiers in physiology*, 9, p.36.

Ha, H., Lantz, J., Ziegler, M., Casas, B., Karlsson, M., Dyverfeldt, P. and Ebbers, T., 2017. Estimating the irreversible pressure drop across a stenosis by quantifying turbulence production using 4D flow MRI. *Scientific reports*, 7, p.46618.

Ha, H., Lantz, J., Haraldsson, H., Casas, B., Ziegler, M., Karlsson, M., Saloner, D., Dyverfeldt, P. and Ebbers, T., 2016. Assessment of turbulent viscous stress using ICOSA 4D Flow MRI for prediction of hemodynamic blood damage. *Scientific Reports*, 6, p.39773.

Ha, H., Kim, G.B., Kweon, J., Kim, Y.H., Kim, N., Yang, D.H. and Lee, S.J., 2016. Multi-VENC acquisition of four-dimensional phase-contrast MRI to improve precision of velocity field measurement. *Magnetic resonance in medicine*, 75(5), pp.1909-1919.