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PHD STIPEND IN USING DIGITAL HYDRAULIC IN SECONDARY CONTROL OF CYLINDER DRIVE (14-16069)

At the Faculty of Engineering and Science, Department of Energy Technology a PhD position is available within the general study program Energy Technology. The position is open for appointment from January 1, 2017. The Department of Energy Technology is an expanding department covering most fields of Energy Technology ranging from Electrical Energy Production, Power Systems, Power Electronics, Electrical Machines, Thermal Energy including Energy Systems, Fluid Mechanics and Combustion, and Fluid Power and Mechatronic Systems. The department has about 250 employees – including more than 100 PhD students. The laboratory facilities are of world class standard, and the research is generally carried out in collaboration with the industry.

JOB DESCRIPTION

The position is in relation to the research program SFI OFFSHORE MECHATRONICS, Norway and will be placed at Aalborg University under the research program "Fluid Power in Wind and Wave Energy Applications". The Ph.D. student will be positioned in the section for Fluid Power and Mechatronic Systems.

Background/rationale: Research activities in digitally controlled cylinders has not been as numerous as those in pumps/motors, however, there is an increased emphasis on this area as well. Digital control of linear actuators is based on continuously switching valves that connect the active chambers of the cylinder to a number of pressure levels. A typical architecture includes a cylinder with three active chambers/areas that each may be connected to three pressure levels. That gives a total of nine combinations that, together with the use of accumulators, may yield a smooth secondary control that corresponds to having a cylinder with variable diameter.

Similar to the pump/motor drive, these solutions have the potential of improving the efficiency of the cylinder drive while reducing the demand for complex proportional valve technology. One of the challenges is clearly that the hydraulic cylinder in such a solution is more complex than a standard hydraulic cylinder, i.e., it is not possible to base a solution purely on existing commercially available components. There has been done very limited research documenting the performance of digitally controlled cylinders on low speed high force applications. Therefore, there is a demand for investigating the reliability and performance that can be expected from a digitally controlled hydraulic cylinder under such conditions.

Objective: To investigate possible configurations for using digital hydraulics in secondary control of cylinder drives applied to low speed high force applications. This includes

- developing and comparing hydraulic system architectures and associated control algorithms,
- combining the most promising combination of hydraulic system architectures and control algorithms in a design,
- and implementing and testing the developed design.

As a side constraint on the project, the hydraulic system should be designed based on existing, commercially available, hydraulic switching valves.

The possible candidate is expected to have competencies within several of the following areas:

- Design and control of fluid power systems and components
- Modeling and simulation of both fluid systems and mechanical structures
- Experimental set-ups, experimental work and validation
- Knowledge of fluid dynamics, and possibly CFD and FEM
- Good analytical skills
- Experience with digital hydraulics is beneficial, but not mandatory
- Preferably be able to speak and read Danish as some supervision of undergraduate students may be expected.

The applicant must provide and upload a proper project description, which describes the applicant's initial thoughts and ideas related to the project. This includes a brief state-of-the-art (including short list of references), a time schedule and how the applicant intends to shed light on the project objectives. The project description should have a length of 4-5 pages.

You may obtain further information from Professor Torben Ole Andersen, Department of Energy Technology, phone: +45 9940 9269, email: toa@et.aau.dk concerning the scientific aspects of the position.

PhD stipends are allocated to individuals who hold a Master's degree. PhD stipends are normally for a period of 3 years. It is a prerequisite for allocation of the stipend that the candidate will be enrolled as a PhD student at the Doctoral School of the Faculty of Engineering and Science, in accordance with the regulations of Ministerial

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Order No. 1039 of August 27, 2013 on the PhD Programme at the Universities and Certain Higher Artistic Educational Institutions. According to the Ministerial Order, the progress of the PhD student shall be assessed every six months. It is a prerequisite for continuation of salary payment that the previous progress is approved at the time of the evaluation.

The qualifications of the applicant will be assessed by an assessment committee. On the basis of the recommendation of the assessment committee, the Dean of the Faculty of Engineering and Science will make a decision for allocating the stipend.

For further information about stipends and salary as well as practical issues concerning the application procedure contact Ms. Ruth Klitte, The Faculty of Engineering and Science, email: rk@adm.aau.dk, phone: +45 9940 7993.

The Faculty have a research school, The Doctoral School of Engineering and Science: www.phd.teknat.aau.dk and a Network for all PhD students: www.pau.aau.dk

The application is only to be submitted online by using the "Apply online" button below.

AGREEMENT

Appointment and salary as a PhD fellow are according to the Ministry of Finance Circular of March 26, 2012 on the Collective Agreement for Academics in Denmark, Appendix 5, regarding PhD fellows, and with the Ministry of Finance current circular on the employment structure at Danish Universities.

VACANCY NUMBER

14-16069

DEADLINE

Fri Nov 18 00:00:00 CET 2016

Apply online

