

## ABSTRACT

Yang, Zhiyao. M.S.E., Purdue University, May 2015. Development of Simulation Modules for Liquid Desiccant Systems in SorpSim. Major Professor: Prof. Ming Qu.

Liquid Desiccant Systems (LDS) have been an attractive alternative to the conventional vapor-compression air conditioning technology in HVAC applications for their thermally-driven nature and the expertise in dealing with large latent load in a more energy-efficient way. Much effort has been made during the past decades to study the performance of LDS and their components both experimentally and through modelling approach. However, predicting the performance of LDS is still a skill-demanding task because it involves model implementation, retrieval of fluid properties, solving procedure setup, and preparation of a good set of initial guess value to model just one component. It would take even more efforts to build and calculate an entire system cycle. The presently popular modelling tools, such as Engineering Equation Solver (EES), ASPEN Plus are not able to provide a convenient solution to modeling LDS systems. To meet the needs, SorpSim has been developed for modeling absorption and LDS cycles. SorpSim inherited and expanded a calculation engine from ABSIM, a well-recognized simulation program for absorption systems, and it integrated the engine into a brand-new graphical user interface application. Models of various LDS components have been implemented in SorpSim. The calculation results of the component models match well with experimental data from published literature. With the liquid desiccant modules and the flexible cycle configuration and parametric analysis capabilities, SorpSim provides a convenient and reliable platform for users to build LDS cycle models as well as to carry out simulation and preliminary design optimization. Equipped with the new liquid desiccant modules, SorpSim has become a useful tool to facilitate the research and development of the liquid desiccant technology.