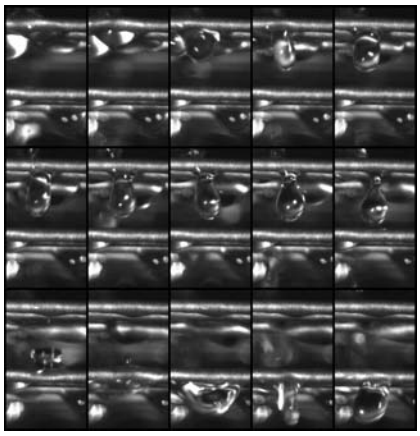
Air-Conditioning and Refrigeration Technology Institute

Project Summary

Fundamental Understanding of Heat and Mass Transfer in the Ammonia/Water Absorber

Renewed interest in the global climate change problem has focused attention on the use of absorption heat pumps, which are environmentally sound, and alternatives to HCFC-based, ozone-depleting space-conditioning systems. Heat-driven absorption systems could offer higher source efficiencies greater than corresponding vapor compression systems in the heating mode. When powered by waste heat, they offer the potential to be part of an overall Integrated Energy System that provides building cooling, heating, and power.



A steam-fired absorption chiller system has several components, the key one being the **absorber** in which ammonia vapor flowing from the evaporator (where the cooling load is satisfied) is absorbed by the diluted solution from the desorber, rejecting its heat to a coolant loop. In the falling film absorber, the solution flows by gravity from the top to the bottom of a tube array (see above). The heat of absorption is then transferred to the absorber coolant flowing through the tubes.

The purpose of this project was to verify a computer model of the absorption process by correlating the key parameters with data gathered from extensive experimental testing. The resulting model can be used by HVAC&R equipment manufacturers to design more efficient and economical absorbers.

Contractor: Georgia Tech Research Institute
Principal Investigator: Srinivas Garimella, Ph.D.
Start Date: 28 October 2003; End-date: 31 December 2006
ARTI Report Number ART-21CR/612-10050-02, June 2007, is posted on the ARTI website, www.arti-research.org
Revised: 8/06/2007