Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Circumventing Imprecise Geometric Information and Development of a Unified Modeling Technique for Various Flow Regimes in Capillary Tubes BAHMAN ABBASI[1], General Electric Appliances — Owing to their manufacturability and reliability, capillary tubes are the most common expansion devices in household refrigerators. Therefore, investigating flow properties in the capillary tubes is of immense appeal in the said business. The models to predict pressure drop in two-phase internal flows invariably rely upon highly precise geometric information. The manner in which capillary tubes are manufactured makes them highly susceptible to geometric imprecisions, which renders geometry-based models unreliable to the point of obsoleteness. Aware of the issue, manufacturers categorize capillary tubes based on Nitrogen flow rate through them. This categorization method presents an opportunity to substitute geometric details with Nitrogen flow data as the basis for customized models. The simulation tools developed by implementation of this technique have the singular advantage of being applicable across flow regimes. Thus the error-prone process of identifying compatible correlations is eliminated. Equally importantly, compressibility and chocking effects can be incorporated in the same model. The outcome is a standalone correlation that provides accurate predictions, regardless of any particular fluid or flow regime. Thereby, exploratory investigations for capillary tube design and optimization are greatly simplified.

[1]Bahman Abbasi, Ph.D., is Lead Advanced Systems Engineer at General Electric Appliances in Louisville, KY. He conducts research projects across disciplines in the household refrigeration industry.

Bahman Abbasi
General Electric Appliances

Date submitted: 03 Aug 2012 Electronic form version 1.4