Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Superfluid ^{4}He density functional theory in 2-D cylindrical coordinates[1] JUSSI ELORANTA, SEAN FRENCH, Department of Chemistry and Biochemistry, California State University at Northridge, STEVEN FIEDLER, Department of Chemical Engineering, The University of Michigan — Bosonic density functional theory describing superfluid ^{4}He is formulated in 2-D cylindrical coordinates and a numerical implementation of the model using a regular spatial grid basis is presented. The 2-D formulation has many important applications as the 1-D treatment cannot, for example, describe translational motion of atoms and molecules solvated in the liquid and the 3-D theory is usually computationally too expensive, especially when describing dynamics in bulk superfluid ^{4}He. The theory is implemented in both real and imaginary time forms for allowing solution of both time-dependent and time-independent problems. Two test cases for the developed method are presented and the results are compared against the previously published results. Finally, the method is applied to describe solvation of single wall carbon nanotubes in superfluid ^{4}He at 0 K and the implications of the results to dynamic liquid response are discussed.

[1]Support from Research Corporation is acknowledged.

Jussi Eloranta
Department of Chemistry and Biochemistry,
California State University at Northridge

Date submitted: 20 Nov 2007 Electronic form version 1.4