Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

An Improved Bubble Packing Method for Unstructured Mesh Generation with Applications in Computational Fluid Dynamics LILONG WU, BIN CHEN, State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an, China — An improved Bubble Packing Method (BPM) is proposed to generate high-quality unstructured mesh for prediction of the flow dynamics in a domain with complex geometries. For curved-boundary domain, firstly each curved boundary is mapped into a straight line, and then new bubble positions will be mapped into curved boundary back by arc-length parameterization method after the bubble system on the mapped straight line reaches equilibrium. In this way the bubble's departure from curved boundaries during dynamic movement of the bubbles can be avoided. Moreover, the grid density can be controlled simply and effectively. Local mesh refinement is realized by adding different size bubbles to the real / artificial vertices of the domain and bubble information of these vertices is transferred to the inner nodes of the domain by using the Shepard interpolation method. In order to validate the proposed algorithm, unstructured collocated grid systems are developed to numerically simulate lid-driven flow in square and polar cavities. The good agreement between numerical simulations with literatures under different Reynolds numbers confirms the effectiveness and feasibility of our proposed algorithm.

Lilong Wu
State Key Laboratory of Multiphase Flow in Power Engineering,
Xi'an Jiaotong University, Xi'an, China

Date submitted: 23 Jun 2009 Electronic form version 1.4