1135-65-124 **Alejandro L. Garcia*** (`alejandro.garcia@sjsu.edu`). *Algorithm Refinement - A 20 year Retrospective.*

When a large range of scales must be spanned, computational fluid dynamics (CFD) calculations often employ Mesh Refinement so that a fine grid is used only in those regions that require high resolution. However, hydrodynamic formulations break down as the grid spacing approaches the molecular scale, for example, the mean free path between collisions of molecules in a gas. At these microscopic scales additional physics, such as random molecular motion, can be important yet it is not accurately represented by conventional hydrodynamic models.

Algorithm Refinement is an effective approach for such multiscale problems that span macroscopic to microscopic scales. Algorithm Refinement typically couples two structurally (physically and algorithmically) different computational models, which are used in different regions of the problem. For example in a hypersonic flow simulation a particle-based scheme could be used to resolve shock wave structure and a hydrodynamic solver used to model the rest of the flow.

The talk will present a review of Algorithm Refinement, describing both its strengths and weaknesses. The current state-of-the-art for these hybrid schemes and the promising future directions for Algorithm Refinement will be outlined. (Received July 29, 2017)