1159-70-206 **V M Krushnarao Kotteda** (kvmkrao@gmail.com), 1000 E University Ave, Department of Mechanical Engineering, Laramie, WY 82070, **Arturo Rodriguez*** (arodriguez123@miners.utep.edu), 500 W university Ave, Department of Mechanical Engineering, El Paso, TX 79968, **Vinod Kumar** (vkumar@utep.edu), 500 W University Ave, Department of Mechanical Engineering, El Paso, TX 79968, and **Natasha Sharma** (nssharma@utep.edu), 500 W University Ave, Department of Mathematical Science, El Paso, TX 79968. *Automating Mesh Adaptivity with Neural Network in Volume of Fluids methods for Multiphase Flows.*

Multiphase flow is prevalent in fossil, renewable, and nuclear energy as well as many other processes such as coal gasifier reactors, fluidized bed reactors, particle receivers, or even aerosol/virus transmission. Understanding the behavior of such flows can assist in devising better post- and pre-combustion CO2 capture technologies, reducing CO2 emission to the atmosphere, and improving the understanding of aerosol transmission. The flow regime in such multiphase systems often involves physics and physical phenomena occurring at multiple spatial and temporal scales. Analytic solutions to such complex multiphysics problems are rarely available. Numerical approaches are often used to investigate the underlying physics. In order to obtain a "good" approximation of the true solution, a high-fidelity approximation (such as high-resolution meshes) can be used. However, this leads to extremely large scale problems on the discrete level which pose many challenges to numerical computations due to prohibitively high computational expense or poorly-conditioned linear systems. We will present analysis work for Partially Observable Markov Decision Processes, a Reinforced Machine Learning framework based on the Markov Decision Process for automating the mesh adaptivity of multiphase flows. (Received August 05, 2020)