

## **Emulating AC OPF solvers for Obtaining Sub-second Feasible, Near-Optimal Solutions**

Using machine learning to obtain solutions to AC optimal power flow has recently been a very active area of research due to the astounding speedups that result from bypassing traditional optimization techniques. However, generally ensuring feasibility of the resulting predictions while maintaining these speedups is a challenging, unsolved problem. Here, we train a neural network to emulate an iterative solver in order to cheaply and approximately iterate towards the optimum. Once we are close to convergence, we then solve a power flow to obtain an overall AC-feasible solution. Results shown for networks up to 1,354 buses indicate the proposed method is capable of finding feasible, near-optimal solutions to AC OPF in milliseconds on a laptop computer. In addition, it is shown that the proposed method can find “difficult” AC OPF solutions that cause flat- start or DC-warm started algorithms to diverge.