

Neural networks are becoming an ever more prominent method in the field of differential equations. Their use is embodied in the concept of physics-informed neural network (PINN), which combines a traditional deep neural network with the underlying laws of physics described by PDEs. We investigate the abilities of this relatively novel approach on three diverse examples in order to give a good overview of its advantages and issues. Every problem is also solved via the finite element method, which serves as a reference. In addition to that, we propose the usage of pre-training, which is already present in other scientific areas. If we initialize the process of solving of one equation with a solution to a similar problem, in some settings, we were able to significantly reduce computation time, which is major drawback of PINNs.