WAN DISCRETIZATION OF PDES: BEST APPROXIMATION, STABILIZATION AND BOUNDARY CONDITIONS

SILVIA BERTOLUZZA

ABSTRACT. We present a theoretical analysis of the Weak Adversarial Networks (WAN) method, recently introduced in [1, 2], where its was proposed as a method for approximating the solution of partial differential equations in high dimensions and tested in the framework of inverse problems. In a very general abstract framework, we will address issues related with the existence and stability of the discrete solution, as well as approximation bounds, in the spirit of Cea's Lemma. We will also propose two new WAN-based abstract formulations that, by avoiding the need for direct normalization, result in more favorable versions of the optimization problem to be solved for obtaining the approximate solution. Furthermore, we analyze the method's effectiveness for the solution of Dirichlet boundary problems with implicit representation of the geometry.

REFERENCES

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CNR – Istituto di Matematica applicata e Tecnologie Informatiche "Enrico Magenes", Via Ferrata 5/A, 27100 Pavia, Italy

Email address: silvia.bertoluzza@imati.cnr.it