**Cover Letter for the manuscript, “Look-Ahead SCOPF (LASCOPF) for Tracking Demand Variation via Auxiliary Proximal Message Passing (APMP) Algorithm”**

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**Title:** **Look-Ahead SCOPF (LASCOPF) for Tracking Demand Variation via Auxiliary Proximal Message Passing (APMP) Algorithm**

**Abstract:** In this paper, we will consider the Look-Ahead Security Constrained Optimal Power Flow (LASCOPF) problem looking forward multiple dispatch intervals, in which the load demand varies over dispatch intervals according to some forecast. We will consider the base-case and several contingency scenarios in the upcoming as well as in the subsequent dispatch intervals. We will formulate and solve the problem in a Model Predictive Control (MPC) paradigm. We will present the Auxiliary Proximal Message Passing (APMP) algorithm to solve this problem, which is a bi-layered decomposition-coordination type distributed algorithm, consisting of an outer Auxiliary Problem Principle (APP) layer and an inner Proximal Message Passing (PMP) layer. The APP part of the algorithm distributes the computation across several dispatch intervals and the PMP part performs the distributed computation within each of the dispatch interval across different devices (i.e. generators, transmission lines, loads) and nodes or nets. We will demonstrate the effectiveness of our method with a series of numerical simulations.

**Significance of the Present Work:** Other than its own academic, intellectual, and research merit, the present work will act as the foundation, based on which, we will be developing more advanced versions of SCOPF, which will enable us to actively implement post-contingency restorative and corrective actions within the dispatch optimization. The algorithm, that we have presented here, will also be useful in several other large-scale optimization problems, which inherently have a nested-parallelization capability, to speed up computation time.

**Contribution of Sambuddha Chakrabarti in the present work:** Sambuddha Chakrabarti (the first and corresponding author) has been primarily responsible for carrying out the software development, fine-tuning the algorithm, and also developing the details of the mathematical model.

**Contribution of Ross Baldick:** Ross Baldick has been mainly responsible for generating the idea, master-planning of the project, part of which is this submission, inviting the funding, and coordinating the entire project. He has a profound contribution at refining the mathematical model and sugesting the particular algorithms, which has been made use of, in this paper.

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