A convergence control scheme for multi-stage holomorphic embedding load-flow method

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Abstract-

Power flow analysis is a key tool for planning, operation, and control of power systems. The most novel family of power flow algorithms is based on the Holomorphic Embedding Load-flow Method (HELM), presented a decade ago. Within that family, the Multi-Stage HELM (MSHELM) is a further step from the HELM that improves convergence properties. This paper presents a Multi-Stage HELM scheme designed to speed up the convergence of power flow equations. The convergence process is monitored by a convergence factor that allows controlling the exit criterion at each of the stages of the MSHELM. The convergence factor presented provides a continuous connection between two discrete alternatives, i.e., the original HELM model and an MSHELM model with only first-degree stages, opening the possibility of finding the optimal alternative in between.

Index Terms- Power flow, holomorphic embedding, convergence control.