High Energy Physics - Theory

Non-Abelian Vortices in Supersymmetric Gauge Field Theory via Direct Methods

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Vortices in supersymmetric gauge field theory are important constructs in a basic conceptual phenomenon commonly referred to as the dual Meissner effect which is responsible for color confinement. Based on a direct minimization approach, we present a series of sharp existence and uniqueness theorems for the solutions of some non-Abelian vortex equations governing color-charged multiply distributed flux tubes, which provide an essential mechanism for linear confinement. Over a doubly periodic domain, existence results are obtained under explicitly stated necessary and sufficient conditions that relate the size of the domain, the vortex numbers, and the underlying physical coupling parameters of the models. Over the full plane, existence results are valid for arbitrary vortex numbers and coupling parameters. In all cases, solutions are unique.

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