# Equations of Electromagnetic Self-Consistency in a Plasma

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Abstract: The set of equations governing a system consisting of an electromagnetic field plus charges in it is obtained by varying the appropriate action. It is not assumed that the currents are given, which in fact leads to the Maxwell equations governing the fields. Nor is it assumed that the fields are given, which in fact would lead to the determination of the motions of the charges (the currents) through the Lorentz force. On the contrary, currents and fields are left free to interplay, and they can be found simultaneously from the equations obtained.

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