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Field Induced Positional Shift and Second Order Semiclassical Theory for Bloch Electrons YANG GAO, UT Austin, SHENGYUAN YANG, Singapore University of technology and design, QIAN NIU, UT Austin — We derive a positional shift due to the interband mixing induced by external electromagnetic fields. This positional shift plays a central role in the second order semiclassical theory for Bloch electrons. It also provides rich physics, e.g. the magnetoelectric coupling, the nonlinear anomalous Hall, etc. We also derive the semiclassical wave packet energy up to second order. With these two essential corrections, we show that the second order semiclassical dynamics possesses the exact same structure as the first order one, rendering a simple generalization of various response functions.

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