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When a Traffic Light Turns Green, a Study of Traffic Flow Using Partial Differential Equations

Partial differential equations, PDEs, are used in many applied mathematical models. In the summer research performed, PDEs were used to model traffic flow and the theoretical behavior of cars on simple roadways. As with ordinary differential equations, partial differential equations have many different forms of a variety of orders. The PDE used for traffic flow, and the focus of the current research, was the homogeneous advection equation involving the traffic density as the spacial and time varying function. Methods to solve this equation, and how it related to traffic flow, were studied out of Richard Haberman's text titled Mathematical Models. Only solutions to the linear advection equation were sought, leading to one of the most fundamental wave function solutions to PDEs.