Spatio-temporal nonlinear dynamics of asymmetrically coupled elements

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Here I plan to discuss some general properties of systems where the interaction between constituents is asymmetric: agents in front i.e. in propagation direction, have a bigger influence on the agent behavior than those behind. In other words, Ill be interested in systems where the third Newton's law: "For every action there is an equal and opposite counteraction", does not work. I plan to discuss two examples: traffic flow dynamics and pedestrian dynamics in corridors, and show that all these systems belong to a class of non-gradient systems for which spatio-homogeneous distribution of elements is unstable and new spatio-temporal structures arise. For traffic problem it corresponds to a spontaneous jam formation. The asymmetry of interaction between pedestrians leads to a creation of peristaltic waves in the pedestrian flow.