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## Neural semi-Lagrangian method for high-dimensional advection-diffusion problems

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We are interested in numerically solving high-dimensional advection-diffusion equations, such as kinetic equations or parametric problems. Traditional numerical methods suffer from the curse of dimensionality, as the number of degrees of freedom grows exponentially with dimension. Recently, methods based on neural networks have proven effective in reducing the number of degrees of freedom by enriching classical approximation spaces. In this presentation, we will introduce a semi-Lagrangian neural method: at each time step, it consists of advecting the solution exactly, following the characteristic curves of the equation, and projecting it onto the neural approximation space. We provide rough error estimates and present several high-dimensional numerical experiments to evaluate the performance of the method. This is a joint work with Emmanuel Franck, Victor Michel-Dansac and Vincent Vigon.

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