Generalized stochastic flow associated to the Itô SDE with partially Sobolev coefficients and its application

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Abstract. We consider the Itô SDEs on $\mathbb{R}^n$ with partially Sobolev coefficients. Assuming the exponential integrability of the negative part of the divergence of the drift coefficient and the partial gradient of the diffusion coefficient with respect to the Cauchy measure, we show the existence, uniqueness and stability of generalized stochastic flows associated to such equations. As an application, we prove the weak differentiability in the sense of measure of the stochastic flow generated by the Itô SDE with Sobolev coefficients.