

cases	doc_1		doc_2		decision	id
	authors	<ul style="list-style-type: none">Wayne Isaac T. UyMircea Grigoriu	authors	<ul style="list-style-type: none">Wayne Isaac Tan UyMircea Grigoriu	DUPLICATES	264
	title	Neural network representation of the probability density function of diffusion processes	title	Neural network representation of the probability density function of diffusion processes		
	publication_date	2020-09-09 00:00:00	publication_date	2020-04-19 00:00:00		
	source	SupportedSources.OPENALEX	source	SupportedSources.INTERNET_ARCHIVE		
	journal	Chaos	journal			
	volume	30	volume			
	doi	10.1063/5.0010482	doi			
	urls	<ul style="list-style-type: none">https://openalex.org/W3083772601https://doi.org/10.1063/5.0010482http://arxiv.org/pdf/2001.05437	urls	<ul style="list-style-type: none">https://web.archive.org/web/20200508014248/https://arxiv.org/pdf/2001.05437v2.pdf		
	id	id-7720143324705524815	id	id1805920897457675023		
	abstract		abstract	Physics-informed neural networks are developed to characterize the state of dynamical systems in a random environment. The neural network approximates the probability density function (pdf) or the characteristic function (chf) of the state of these systems which satisfy the Fokker-Planck equation or an integro-differential equation under Gaussian and/or Poisson white noises. We examine analytically and numerically the advantages and disadvantages of solving each type of differential equation to characterize the state. It is also demonstrated how prior information of the dynamical system can be exploited to design and simplify the neural network architecture. Numerical examples show that: 1) the neural network solution can approximate the target solution even for partial integro-differential equations and system of PDEs describing the time evolution of the pdf/chf, 2) solving either the Fokker-Planck equation or the chf differential equation using neural networks yields similar pdfs of the state, and 3) the solution to these differential equations can be used to study the behavior of the state for different types of random forcings.		
	versions		versions			