

Cambridge University Press 978-1-107-02282-9 - Mathematics of Two-Dimensional Turbulence Sergei Kuksin and Armen Shirikyan Table of Contents More information

## Contents

	Prej	face	page ix
1	Preliminaries		1
	1.1	Function spaces	1
	1.2		5
	1.3		22
		Notes and comments	35
2	Two	o-dimensional Navier–Stokes equations	36
	2.1	Cauchy problem for the deterministic system	36
	2.2	Stochastic Navier–Stokes equations	58
	2.3	Navier-Stokes equations perturbed by a random kick force	62
	2.4	Navier-Stokes equations perturbed by spatially	
		regular white noise	69
	2.5	Existence of a stationary distribution	87
	2.6	Appendix: some technical proofs	93
		Notes and comments	99
3	Uniqueness of stationary measure and mixing		101
	3.1	Three results on uniqueness and mixing	104
	3.2	Dissipative RDS with bounded kicks	115
	3.3	Navier-Stokes system perturbed by white noise	126
	3.4	Navier-Stokes system with unbounded kicks	141
	3.5	Further results and generalisations	145
	3.6	Appendix: some technical proofs	159
	3.7	Relevance of the results for physics	168
		Notes and comments	169



Cambridge University Press 978-1-107-02282-9 - Mathematics of Two-Dimensional Turbulence Sergei Kuksin and Armen Shirikyan Table of Contents More information

viii Contents

4	Ergodicity and limiting theorems		173
	4.1	Ergodic theorems	173
	4.2	Random attractors and stationary distributions	182
	4.3	Dependence of a stationary measure on the random force	202
	4.4	Relevance of the results for physics	209
		Notes and comments	210
5	Inviscid limit		
	5.1	Balance relations	211
	5.2	Limiting measures	218
	5.3	Relevance of the results for physics	241
		Notes and comments	244
6	Miscellanies		
	6.1	3D Navier–Stokes system in thin domains	245
	6.2	Ergodicity and Markov selection	251
	6.3	Navier-Stokes equations with very degenerate noise	264
	Appendix		
	A.1	Monotone class theorem	269
	A.2	Standard measurable spaces	270
		Projection theorem	271
	A.4	Gaussian random variables	271
	A.5	Weak convergence of random measures	274
	A.6	The Gelfand triple and Yosida approximation	275
	A.7	Itô formula in Hilbert spaces	277
	A.8	Local time for continuous Itô processes	282
	A.9	Krylov's estimate	283
	A.10 Girsanov's theorem		285 286
		A.11 Martingales, submartingales, and supermartingales	
	A.12	2 Limit theorems for discrete-time martingales	288
	A.13	3 Martingale approximation for Markov processes	289
	A.14	4 Generalised Poincaré inequality	291
	A.15	5 Functions in Sobolev spaces with a discrete essential range	292
	Solutions to selected exercises		
	Note	ntion and conventions	304
	References		307
	Inde	x	319