

Contents

Preface	ix
1 Introduction	1
2 Lagrangian and Eulerian descriptions of hydrodynamic systems	5
2.1 Incompressible Euler equations	11
3 Hydrodynamic models	23
3.1 The Lagrangian-Eulerian structure	23
3.2 SQG	26
3.3 Porous medium	27
3.4 Boussinesq	28
3.5 Oldroyd-B	31
4 Spaces and operators	33
4.1 Spaces	33
4.2 Operators	34
5 The Lagrangian-Eulerian existence theorems	43
5.1 Local existence	43
5.2 Small data global existence with damping	47
6 Critical dissipative active scalars	51
6.1 Lower bounds on the fractional Laplacian	51
6.2 Hölder regularity	54
6.3 Higher regularity	56
Bibliography	59
Index	63