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# LARGE DEVIATIONS PRINCIPLE FOR THE INVARIANT MEASURES OF THE 2D STOCHASTIC NAVIER-STOKES EQUATIONS ON A TORUS

Z. BRZEŹNIAK AND S. CERRAI

Abstract. We prove here the validity of a large deviation principle for the family of invariant measures associated to a two dimensional Navier-Stokes equation on a torus, perturbed by a smooth additive noise.

## Contents



## 1. Introduction

In the present paper we are dealing with 2-D Navier Stokes equations with periodic boundary conditions, perturbed by a small additive noise. These boundary conditions are usually realized by considering the problem on a two-dimensional torus $\mathbb{T}^2$, see Section 2 for more details. To fix readers attention, let us write down these equations in a functional form, as

$$du(t) + \mathrm{A}u(t)\,dt + \mathrm{B}(u(t), u(t))\,dt = \sqrt{\varepsilon}\;dw(t), \qquad u(0) = u_0, \tag{1.1}$$

for $0 < \varepsilon << 1$.

Full definitions of the symbols involved can be found later in Section 2, but, for the time being, let us recall that A is the Stokes operator, equal, roughly speaking, to the Laplace operator (acting on vector fields) composed with the Leray-Helmoltz projection $P$, defined on the space of zero mean and square integrable vector fields

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