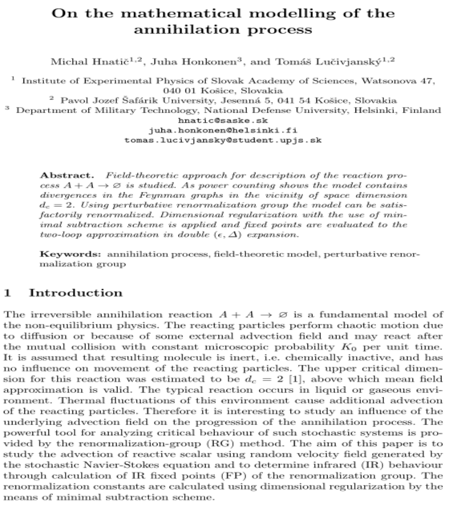
Field Theoretic Renormalization Group in Fully Developed Turbulence



On the mathematical modelling of the annihilation process

Michal Hnatič[1,2], Juha Honkonen[3], and Tomáš Lučivjanský[1,2]

[1] Institute of Experimental Physics of Slovak Academy of Sciences, Watsonova 47, 040 01 Košice, Slovakia
[2] Pavol Jozef Šafárik University, Jesenná 5, 041 54 Košice, Slovakia
[3] Department of Military Technology, National Defense University, Helsinki, Finland
hnatic@saske.sk
juha.honkonen@helsinki.fi
tomas.lucivjansky@student.upjs.sk

Abstract. *Field-theoretic approach for description of the reaction process $A + A \to \varnothing$ is studied. As power counting shows the model contains divergences in the Feynman graphs in the vicinity of space dimension $d_c = 2$. Using perturbative renormalization group the model can be satisfactorily renormalized. Dimensional regularization with the use of minimal subtraction scheme is applied and fixed points are evaluated to the two-loop approximation in double (ϵ, Δ) expansion.*

Keywords: annihilation process, field-theoretic model, perturbative renormalization group

1 Introduction

The irreversible annihilation reaction $A + A \to \varnothing$ is a fundamental model of the non-equilibrium physics. The reacting particles perform chaotic motion due to diffusion or because of some external advection field and may react after the mutual collision with constant microscopic probability K_0 per unit time. It is assumed that resulting molecule is inert, i.e. chemically inactive, and has no influence on movement of the reacting particles. The upper critical dimension for this reaction was estimated to be $d_c = 2$ [1], above which mean field approximation is valid. The typical reaction occurs in liquid or gaseous environment. Thermal fluctuations of this environment cause additional advection of the reacting particles. Therefore it is interesting to study an influence of the underlying advection field on the progression of the annihilation process. The powerful tool for analyzing critical behaviour of such stochastic systems is provided by the renormalization-group (RG) method. The aim of this paper is to study the advection of reactive scalar using random velocity field generated by the stochastic Navier-Stokes equation and to determine infrared (IR) behaviour through calculation of IR fixed points (FP) of the renormalization group. The renormalization constants are calculated using dimensional regularization by the means of minimal subtraction scheme.

The renormalization group (RG) theory of fully developed hydrodynamical turbulence is a new and developing field of research. This book gives a detailed and.Field Theoretic Renormalization Group in Fully Developed Turbulence [thevalleysoftball.com Adzhemyan, N.V. Antonov, A.N. Vasiliev] on thevalleysoftball.com *FREE* shipping on.Field Theoretic Renormalization Group in Fully Developed Turbulence by Adzhemyan, thevalleysoftball.com, Antonov, N.V., Vasiliev, A.N. () Hardcover on Amazon. com.The Field Theoretic Renormalization Group in Fully Developed Turbulence. By L. Ts. ADZHEMYAN, N. V. ANTONOV & A. N. VASILIEV. Gordon.Download Citation on ResearchGate   The Field Theoretic Renormalization Group in Fully Developed Turbulence. By L. Ts. ADZHEMYAN, N. V. ANTONOV.The field theoretic renormalization group in fully developed turbulence. thevalleysoftball.com Adzhemian, N.V. Antonov, A.N. Vasiliev (St. Petersburg State U.).Price, review and buy Field Theoretic Renormalization Group in Fully Developed Turbulence at best price and offers from thevalleysoftball.com Shop Education, Learning.The Field Theoretic Renormalization Group in Fully Developed Turbulence (Hardback) by L.T. Adzhemyan, Etc., thevalleysoftball.com Adzheyman and a great selection of.We use the renormalization group method to study the stochastic Navier-Stokes equation with a random renormalization group fully developed turbulence.The. Field. Theoretic. Renormalization. Group. in. Fully. Developed. Turbulence. thevalleysoftball.com Adzhemyan, N.V. Antonov and A.N. Vasiliev St Petersburg State University .Using the renormalization group method and the operator of a passive scalar admixture by a random Gaussian field of velocities and anomalous scaling in a simple model of turbulent diffusion Download to read the full article text . Theoretic Renormalization Group in Fully Developed Turbulence.The field theoretic renormalization group (RG) and the operator Understanding of fully developed turbulence is a very complex problem.Quantum field renormalisation group results of the theory of developed turbulence are reviewed. Background information about quantum field renormalisation.Find great deals for The Field Theoretic Renormalization Group in Fully Developed Turbulence by L.T. Adzhemyan, etc., A.N. Vasiliev, thevalleysoftball.com Adzheyman, N.V.Description. The rermalization group (RG) theory of fully developed hydrodynamical turbulence is a new and developing field of research. This book gives a.Inertial-range asymptotic behavior of fully developed turbulence is studied by means of the field theoretic renormalization group within the one-loop.GROUP. IN. FULLY. DEVELOPED. TURBULENCE PDF - Search results,. Renormalization is a collection of techniques in quantum field theory, the statistical.quantum field theory reaction-diffusion . Current State of Theory for Fully Developed Turbulence exact analytical .. renormalization group.in Critical Behavior theory and Stochastic Dynamics. Book's Title "The Field Theoretic Renormalization Group in Fully Developed Turbulence". Gordon and.ideas of the renormalization group and the ? expansion applied to critical pheno- theory, the predictions of quantum field theory would disagree with the experiof' fully developed turbulence, many problems in critical phenomena and.