

Euclidean Green's Functions for Jaffe Fields

Florian Constantinescu and Willi Thaleimer

Institut für Angewandte Mathematik, Universität Frankfurt, Frankfurt am Main,
Federal Republic of Germany

Received June 11, 1973; in revised form April 1, 1974

Abstract. We extend the axioms for Euclidean Green's functions recently proposed by Osterwalder and Schrader to Jaffe fields.

§ 1. Introduction

We extend in this paper results of Osterwalder and Schrader [11, 12] on Euclidean Green's (Schwinger) functions to Jaffe fields.

In the first part of their work Osterwalder and Schrader give a precise distribution-theoretic definition of the Euclidean Green's functions and investigate properties of these Schwinger functions as a consequence of the Wightman axioms (in the case of tempered fields). In the second part of their work they give a system of axioms for the Schwinger functions which allow the reconstruction of a unique Wightman theory (for tempered fields).

On the other hand, Jaffe [8] extended the Wightman theory by considering fields (in x -space) as certain classes of operator-valued ultradistributions. Correspondingly, in p -space, Jaffe fields need not be tempered.

We study in this paper Euclidean Green's functions for Jaffe fields and extend the results of Osterwalder and Schrader to these classes of fields. Several alterations have to be made in the original proofs of Osterwalder and Schrader. So, for example, some new techniques are necessary in order to handle the stronger singularities of the Fourier-Laplace transform of ultradistributions on the real axis. Also the contractivity of the time-translation operator requires a different proof, using the general form of linear continuous functionals over \mathfrak{M} (see for instance [5]).

We shall use freely the notations of Osterwalder and Schrader [11, 12].