THE EVOLUTION OF BOGOLYUBOV'S RENORMALIZATION GROUP*

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We review the evolution of the concept of Renormalization Group (RG). This notion, as was first introduced in quantum field theory (QFT) in the mid-fifties in N.N.Bogolyubov's formulation, is based upon a continuous symmetry of a solution with respect to transformation involving parameters (e.g., of a boundary condition) specifying some particular solution.

We follow the proliferation of QFT RG into other fields of physics and recall that the underlying transformation is closely related to the self-similarity property. It can be treated as a generalization of the latter, the Functional Self-Similarity (FS).

Then we turn to the essential progress during the last decade in using the Bogolyubov's RG concept in mathematical physics. Here, a regular approach for discovering the RG=FS symmetries with the help of the modern Lie group analysis for a boundary-value problem (formulated in terms of differential equations) has been devised.

To illustrate this approach's effectiveness, we end with its application to the analysis of the laser beam self-focusing in a non-linear medium.