

# MEAN CHARACTERISTICS OF GIBBSIAN POINT PROCESSES

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(Received June 20, 1988; revised June 15, 1989)

**Abstract.** This paper deals with the derivation of an exact expression of mean characteristics of planar global Gibbsian point processes having pair potential functions. The method is analogous to that of the Mayer expansion of grand partition functions, i.e., the reciprocal of the normalizing constant of Gibbsian distribution (well-known in statistical physics). The explicit infinite series expansion of a logarithm of a class of mean quantities with respect to the activity parameter  $z$  is derived and the expression of its coefficients is given. The validity of this expansion for a range of  $z$  is also shown. Examples of mean characteristics to which this expansion can be applied are given. Finally, a simple numerical example is given in order to show the usage of this expansion as a numerical approximant of mean characteristics.

*Key words and phrases:* Gibbsian point process, pair potential function, spatial statistics, stochastic geometry, mean characteristics, Mayer expansion, nearest neighbor distribution, spherical contact distribution, numerical approximation.