

## **Asymptotic Expansion of Double Oscillatory Integrals: Contribution of Non Stationary Critical Points of the Second Kind**

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**Abstract :** In this paper, we consider the problem of asymptotics of double oscillatory integrals in the case of critical points of the second kind, the order of contact between the boundary and a level curve of the phase being even, the situation when the order of contact is odd will be studied in other occasions. Complete asymptotic expansions will be derived and the coefficient of the leading term will be computed in terms of the original data of the problem. A multitude of people have studied this problem using a variety of methods, but only in a special case when the order of contact is minimal: the more cited papers are a paper of Jones and Kline and an other one of Chako. These integrals are encountered in many areas of science, especially in problems of diffraction of optics.

**Keywords :** asymptotic expansion, double oscillatory integral, critical point of the second kind, optics diffraction

**Conference Title :** ICM 2016 : International Conference on Mathematics

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** February 15-16, 2016