A HILBERT–TYPE INEQUALITY IN THE WHOLE PLANE WITH THE CONSTANT FACTOR RELATED TO SOME SPECIAL CONSTANTS

MINGHUI YOU, FEI DONG AND ZHENHUA HE *

Abstract. In this work, a new kernel function defined in the whole plane, including both the homogeneous and the non-homogeneous cases, and involving multiple parameters is constructed. By the method of weight coefficient and using some techniques of real analysis, a new Hilbert-type inequality with the newly constructed kernel function, as well as its equivalent Hardy-type inequality are established. The constant factors of the obtained inequalities are proved to be the best possible. Furthermore, assuming special values to the parameters, some interesting and special Hilbert-type inequalities with the constant factors involving some special constants, such as the Euler number, Bernoulli number and the Catalan constant are presented at the end of the paper.

Keywords and phrases: Hilbert-type inequality, special constant, Bernoulli number, Euler number, Catalan constant.

REFERENCES