Introduction. The airborne wear particles emission from brake sliding contact is the second main source of the environmental pollution after fuel combustion, and it is about 25% of the total amount of the emitted particulate matter related to transport vehicles. These particles contain toxic substances (heavy metals and their oxides, polymers, plastics and products of their chemical reactions and thermal degradation, etc.), which may penetrate through the air, water or food into the human body (e.g. into skin, lungs, bloodstream and digestive systems, etc.) and in case of stable contact it may result in various diseases, even with fatal outcome. Nowadays, this problem is studied only for ground transport vehicles, including cars, transport trucks, public transport and trains. Unfortunately, such an important type of transport as aircraft are not on this list. Furthermore, it was claimed about enormous impact of civil aviation emission on the health of population in the 20 km near-airport area and concluded that approximately third part of pre-matures fatal outcomes at it are caused by particle air pollution. Taking into account the appearance and quick development of the new types of electro-hybrid and electro-battery airplanes in long perspective, the main source of environmental pollution produced by airplanes could be most probably airborne wear particles emission from brakes during the landing. Therefore, the airborne wear particles emission from airplane brake may have more significant impact on the total environment pollution at the airports, and semi-closed areas, and therefore it should be studied.

Scientific goal of the project and concept. The main project purpose is to develop *a new methodology for assessing airborne wear particle emission from sliding contact of an airplane brake with account of airplane brake types*. The idea of the project is based on applying a new experimental setup for airborne wear particle measurements with high-efficient sampling that provides sliding velocity and contact pressure corresponding to real values in the airplane brakes of various airplane types. The *geometrical optimization of the disc-on-disc friction couple* will be conducted to reproduce ranges of sliding velocities and contact pressures in airplane brakes. Reliable measurement of airborne wear particles emission from airplane brake will be performed with the help of the *developed experimental measuring setup* that provides high-efficient sampling of airborne wear particles emitted from disc-on-disc contact. A *new sub-scale test procedure and methodology for assessing the level of airborne wear particle emission from airplane brake* will be developed.

Research methodology of the project. To implement the project successfully, the solution of the following research tasks is required. (1) Design of the friction couple to reproduce friction conditions that take place in airplane brake applying powerful disc-on-disc friction machine and optimizing the geometry of friction couple to reproduce friction conditions in the airplane brake. (2) Design of the measuring system for sampling airborne wear particles emitted from airplane brake, optimizing the geometry of the isolated clean chamber where the friction takes place. (3) Development and validation of the draft sub-scale test cycle for assessing the level of airborne wear particle emission from airplane brake; preparation to the experimental study. (4) Sub-scale experimental studies of the airplane brake materials at various conditions: at transient regimes(acceleration, braking, velocity step, developed draft sub-scale test cycle, change of the contact pressure, etc.), for various types of airplane brake materials (low-metallic, steel and carbon). (5) Full-scale test rig experimental studies of airplane brake materials at mostly closed to the real life conditions according to aviation standards for airplane brake tests. (6) Analysis of experimental data results for a new methodology for assessing airborne wear particle emission from airplane brake with recommendations for the potential adaptation of the developed methodology to full-scale airplane brake system will be proposed.

Expected impacts. The results of the project will lead to developing the methodology for systematic evaluation of airborne wear particle emission from airplane brakes. The project outcomes may have *scientific impacts*: development and validation of the new methodology for assessing the level of airborne wear particle emission from airplane brake; development and optimization of the friction couple design to reproduce friction conditions in an airplane brake; development of high-efficient experimental measuring setup for sampling airborne wear particles emitted from airplane brake; development of the sub-scale test procedure for assessing the level of airborne wear particle emitted from airplane brake. Furthermore, *ecological impacts* may be expected: application of the proposed methodology for predicting the ecological damage caused by airplane braking process; application of the proposed methodology for designing new eco-friendly aviation brake materials. In addition, potential *economic and social impacts* can be obtained: recommendations for implementation of a new standard restricting environmental pollution caused by airplane braking; development of a new methodology to estimate aviation brake materials ecological friendliness that could be applied as the standard one for manufacturers; increase of society awareness about environment pollutions from aircraft brakes.