CLAIMS

1. A method of calculating a complexity index of an air traffic situation, the method being implemented in an air traffic control system comprising a calculation unit, the air traffic situation (340being defined by an air sector and a time period, wherein the method comprises:
- receiving, by the calculation unit, for the air traffic situation, a set of input parameters being related to the air traffic situation on said air sector, and comprising paths of one or more aircraft (321) crossing the air sector during said time period, said paths being defined by a set of path parameters comprising at least the positions of the one or more aircraft;
- calculating (420), by the calculation unit, for each of the aircraft paths, path parameters, at each time increment among a set of given time increments;
- determining, by the calculation unit, pairs of paths corresponding to all possible pairs of paths among said aircraft paths;
- forming (430) by the calculation unit, a matrix (600) comprising, for each of said determined pairs of paths and each time increment, the values of the path parameters of each path of the pair;
- applying (440) , by the calculation unit, a transformation to said matrix, which provides a transformed matrix comprising components, said transformation having the property of concentrating the energy per component;
- calculating (450), by the calculation unit, the energy of components of said transformed matrix;
- calculating (460) by the calculation unit, a complexity index of the air traffic situation, as a function of a concentration level of energy of components of said transformed matrix,

  wherein the method comprises controlling air traffic from the calculated complexity index.

2. The method as claimed in claim 1, wherein said calculation, for each of the aircraft paths, of path parameters corresponding to positions of the aircraft, at

each time increment, consists in interpolating the positions of the aircraft over the paths.

3. The method as claimed in one of claims 1 and 2, wherein:
- each row of the matrix represents a pair of paths;
- the columns of the matrix respectively represent, for each successive time increment, the values of each of the parameters of the paths for each path of the pair.

4. The method as claimed in one of claims 1 to 3, wherein the concentration level of the energy is defined by the number K of components concentrating a ratio of the total energy greater than or equal to a predefined threshold.

5. The method as claimed in one of claims 1 to 3, wherein the calculation of the complexity index comprises determining the index k of the last component for which a derivative of the overall energy level of the components is greater than or equal to a predefined threshold.

6. The method as claimed in claim 5, wherein the complexity index C is calculated according to the following formulae:

- $C = \frac{k}{k_{max}} * \left[1 - \left(E_{c_k} - E_{c_(k-1)}\right)\right]$, or
- $C = \frac{k}{k_{max}} * \left[1 - \frac{\left(E_{c_(k+1)} - E_{c_(k-1)}\right)}{2}\right]$

where:
- the components are arranged by increasing energy, according to an index k = [1 … N];
- E_{c_k} represents the sum of the energy of components, from index 1 to index k;
- k is the index of the last component for which the derivative of the total energy of the components is greater than or equal to a predefined threshold;
- k_{max} is the index of the component for which the sum of the energies is greater than or equal to a predefined threshold of the total energy of the components.

7. A computer program product comprising program code instructions for carrying out the steps of a method as claimed in one of claims 1 to 6 when said program is executed on a computer.

8. An air traffic control system (300) comprising at least one calculation unit configured to calculate a complexity index of an air traffic situation, being defined by an air sector and a time period, wherein the system comprises:

- at least one input port (320) capable of receiving a set of input parameters being related to the air traffic situation, and comprising, paths of one or more aircraft (321) crossing the air sector during said predefined time period, said paths being defined by a set of path parameters comprising at least the positions of the aircraft;

wherein said at least one calculation unit (310) is configured to:

calculate, for each of the aircraft paths, path parameters, at each time increment among a set of given time increments;

determine pairs of paths corresponding to all possible pairs of paths among said aircraft paths;

form a matrix comprising, for each of said determined pairs of paths and for each time increment, the values of the path parameters of each path of the pair;

apply to said matrix a transformation, which provides a transformed matrix comprising components, said transformation having the property of concentrating the energy per component;

calculate the energy of components of said transformed matrix;

calculate a complexity index of the air traffic situation, as a function of a concentration level of the energy of components of said transformed matrix, wherein the system is adapted to control air traffic from the calculated complexity index.

9. The system as claimed in claim 8, wherein the at least one calculation unit(310) is configured to dynamically redefine the sectors of an airspace, on the basis of complexity indices of the air traffic situation which are iteratively calculated by said method.

10. The system as claimed in claim 9, wherein the at least one calculation unit (310) is configured to solve a problem of constraint optimization, consisting in minimizing the total number of sectors on an airspace under the constraint that the air traffic complexity index calculated, at each iteration, corresponding to one of said sectors and a time period, is less than a predefined complexity.