CLAIMS

1. A method of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, the method comprising an azimuthal coding mode providing a series of bits for encoding a coordinate of a point of the point cloud, wherein the method comprises:

- dividing (202) a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating (203) a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting (106) a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy encoding (107) a bit (b_d), into the bitstream, based on the selected context, the coded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

2. A method of decoding a point cloud from a bitstream of encoded point cloud data representing a physical object, the method comprising an azimuthal coding mode providing a series of bits for decoding a coordinate of a point of the point cloud, wherein the method comprises:

- dividing (202) a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating (203) a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting (106) a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy decoding (302) a bit (b_d), from the bitstream, based on the selected context, the decoded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

3. The method of claim 1 or 2, wherein the left angle ($\varphi_{left,d}$) is interpolated by adding a first angle ($\varphi_{1,d}$) with a weighted difference of a second angle ($\varphi_{2,d}$) and a third angle ($\varphi_{3,d}$), and the right angle ($\varphi_{right,d}$) is interpolated by adding a fourth angle ($\varphi_{4,d}$) with a weighted difference of a fifth angle ($\varphi_{5,d}$) and a sixth angle ($\varphi_{6,d}$).

4. The method of claim 3, wherein the first, second, third, fourth, fifth and sixth angles are inherited angles associated with the parent interval.

5. The method of claim 4, wherein the first, third and six angles all equal to a same inherited angle ($\varphi_{1,d-1}$) associated with the parent interval, and the second, fourth and fifth angles all equal to

another inherited angle ($\varphi_{middle,d-1}$) associated with a middle point of the parent interval, and, an angle ($\varphi_{middle,d}$) associated with a middle point of either the left or right half interval is computed by performing an arc tangent function.

6. The method of claim 4, wherein the first, third and fifth angles all equal to a same inherited angle ($\varphi_{1,d-1}$), and the second, fourth and sixth angles all equal to another inherited angle ($\varphi_{top,d-1}$) equals to an upper bound of the parent interval, and, either an angle ($\varphi_{top,d}$) associated with an upper bound of the left half interval or an angle ($\varphi_{low,d}$) associated with a lower bound of the right half interval is computed by performing an arc tangent function.

7. The method of claim 6, wherein the angle ($\varphi_{top,d}$) associated with the upper bound of the left half interval or the angle ($\varphi_{low,d}$) associated with the lower bound of the right half interval equals to an inherited angle ($\varphi_{middle,d-1}$) associated with a middle point of the parent interval.

8. The method of claim 6, wherein the angle ($\varphi_{top,d}$) associated with the upper bound of the left half interval or the angle ($\varphi_{low,d}$) associated with the lower bound of the right half interval, for encoding a first bit, are computed by performing arc tangent functions, and the angle ($\varphi_{top,d}$) associated with the upper bound of the left half interval or the angle ($\varphi_{low,d}$) associated with the lower bound of the right half interval, for encoding the following bits, equals to an inherited angle ($\varphi_{middle,d-1}$) associated with a middle point of the parent interval.

9. The method of claim 7 or 8, wherein the inherited angle ($\varphi_{middle,d-1}$) associated with the middle point of the parent interval is interpolating from two inherited angles ($\varphi_{1,d-1}$) and ($\varphi_{top,d-1}$) associated with the parent interval.

10. The method of claim 7 or 8, wherein the inherited angle ($\varphi_{middle,d-1}$) associated with the middle point of the parent interval is computed by performing an arc tangent function when a size of the parent interval is greater than or equal to a determined threshold, or otherwise is interpolated from two inherited angles (($\varphi_{1,d-1}$) and ($\varphi_{top,d-1}$)) associated with the parent interval.

11. An apparatus of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, the apparatus comprising one or more processors configured to implement an azimuthal coding mode providing a series of bits for encoding a coordinate of a point of the point cloud, the azimuthal coding mode comprising:

- dividing a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy encoding (107) a bit (b_d), into the bitstream, based on the selected context, the coded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

12. An apparatus of decoding a point cloud from a bitstream of encoded point cloud data representing a physical object, the apparatus comprising one or more processors configured to implement an azimuthal coding mode providing a series of bits for encoding a coordinate of a point of the point cloud, the azimuthal coding mode comprising:

- dividing a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy decoding a bit (b_d), from the bitstream, based on the selected context, the decoded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

13. A computer program product including instructions which, when the program is executed by one or more processors, causes the one or more processors to carry out a method of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, the method comprising an azimuthal coding mode providing a series of bits for encoding a coordinate of a point of the point cloud, wherein the method comprises:

- dividing a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy encoding a bit (b_d), into the bitstream, based on the selected context, the coded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

14. A non-transitory storage medium carrying instructions of program code for executing a method of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, the method comprising an azimuthal coding mode providing a series of bits for encoding a coordinate of a point of the point cloud, wherein the method comprises:

- dividing a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy encoding a bit (b_d), into the bitstream, based on the selected context, the coded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

15. A computer program product including instructions which, when the program is executed by one or more processors, causes the one or more processors to carry out a method of decoding a point cloud from a bitstream of encoded point cloud data representing a physical object, the method comprising an azimuthal coding mode providing a series of bits for decoding a coordinate of a point of the point cloud, wherein the method comprises:

- dividing a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy decoding a bit (b_d), from the bitstream, based on the selected context, the decoded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.

16. A non-transitory storage medium carrying instructions of program code for executing a method of decoding a point cloud from a bitstream of encoded point cloud data representing a physical object, the method comprising an azimuthal coding mode providing a series of bits for decoding a coordinate of a point of the point cloud, wherein the method comprises:

- dividing a parent interval, to which the point coordinate belongs to, into a left half interval and a right half interval;

- interpolating a left angle ($\varphi_{left,d}$), associated with the left half interval, and a right angle ($\varphi_{right,d}$), associated with the right half interval, from at least one inherited angle associated with the parent interval;

- selecting a context depending on the left angle ($\varphi_{left,d}$) and the right angle ($\varphi_{right,d}$); and

- context-adaptive binary entropy decoding a bit (b_d), from the bitstream, based on the selected context, the decoded bit (b_d) indicating which of the two half intervals the point coordinate belongs to.