

Research plan

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In the paper [B], I gave a lower bound of the canonical height on families of elliptic curves. After this I will consider bounds which are applicable under weaker conditions. In the paper, to give the bound we need an assumption about a discriminant of an elliptic curve, which helped us to compute local heights. But without the assumption it seems to be possible to give a lower bound dependent on a discriminant. Then we need to consider the case where the equation which defines the curve is not minimal.

On the other hand I am studying a method to have lower bounds without computations of local heights. Then we use coefficients of equations of the curve we consider, to write bounds. On this consideration an identity seems to be a point.

Second, I constructed families of quadratic twists by using a simple method in the paper [B]. I will consider the background of the method and the way to extend the method. For example I expect to construct elliptic curves of higher rank or hyperelliptic curves. Stewart–Top constructed families of quadratic twists in the paper [3] to study the behavior of the rank of them and there is another research about quadratic twists of higher rank ([1], [2]). Apart from these results, we can construct families of elliptic curves which do not consist of twists. I will also study the behavior of the families, for example, about their discriminants or conductors.

Third I will study elliptic divisibility sequences. These sequences relate to division polynomials of elliptic curves, which we met on computations of local heights. Since there is research of the sequences by using arguments of the canonical height, I search a connection with what I have studied.

References

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- [2] K. Rubin and A. Silverberg. Rank frequencies for quadratic twists of elliptic curves. *Exper. Math.*, Vol. 10, pp. 559–569, 2001.
- [3] C. L. Stewart and J. Top. On ranks of twists of elliptic curves and power-free values of binary forms. *J. Amer. Math. Soc.*, Vol. 8, pp. 943–973, 1995.