CHAPTER 7

CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK

The fact that the received symbol magnitude at the output of demodulator carries more information than what HDD uses, is the basis of SDD. A clear quantification of this information and its identification with the actual reliability of the bit/symbol has led to the concept of RLL. With this it has become possible to identify the TCW directly obviating the need for forming an intermediate set of candidate codewords and then selecting the decoded codeword from them. In short this forms the scope of the RLL based approach to SDD. The method has been applied extensively to binary codes with BPSK schemes to establish its credibility as well as its clear edge. It is only logical to extend the concept to nonbinary codes as well. The same has been done to RS codes; again its applicability is brought out through representative examples. Proceeding in the same vein an attempt has been made to generalize the approach to any block code with any modulation scheme.

Significant offshoots that have emerged through the investigations in the thesis are as follows:

- A practical approach to implementation of RLL is proposed.
- The decoding radius can be flexibly fixed as a threshold suitting to the channel noise conditions.
- Much simpler method of testing with mod $g(x)$ in the process of identification of TCW circumvents the use of elaborate conventional decoding algorithms.
- The TCW identification method with suitable modifications can be used to extract the list of the most reliable codewords in RS schemes. This again circumvents the use of interpolation and factorization steps of list decoding.
• With SDD the unique decoding radius for RS codes is redefined as \((d_{\text{min}} - 1)\) symbol errors from the least reliable end.

**Suggestions for Future work**

The concept of RLL and its use for decoding can possibly be explored further in different ways. Some are indicated below:

1. Possible extension of the RLL concept and RLL based decoding to other channel models.

2. An in-depth analysis of Koetter and Vardy algebraic soft-decision decoding algorithm [28], comparison of RLL based list decoding with the same, and thereby doing a critical appraisal of SDD based list decoding.

3. The RLL scheme seems to be general enough to be applicable to any block code. In other words its extension beyond the realms of RS codes considered here, is worth detailed investigation.

4. The attempt to extend RLL algorithm to codes mapped with non BPSK schemes (Chapter 6) has opened up exciting possibilities; obviously more detailed investigations are called for.

5. Development of suitable architectures and hardware implementations of the RLL based decoding schemes seem to be an interesting area worth investigation.

6. Exploring the applicability of RLL based decoding with suitable modifications to concatenated coding schemes is a potential direction for future work.