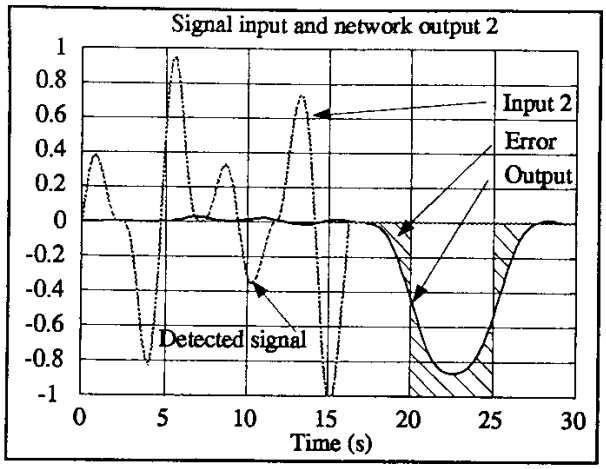
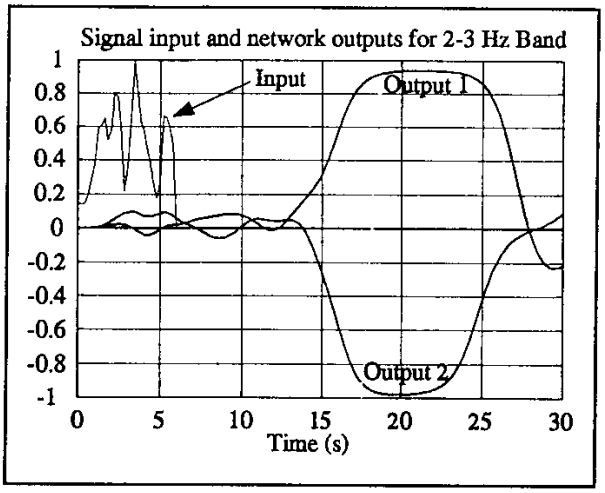
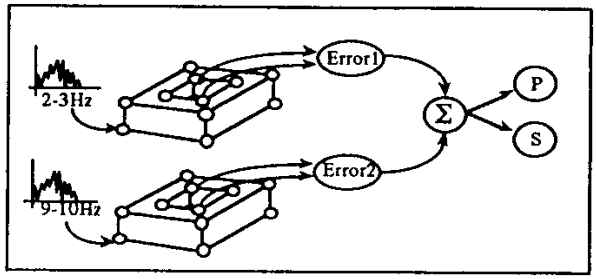
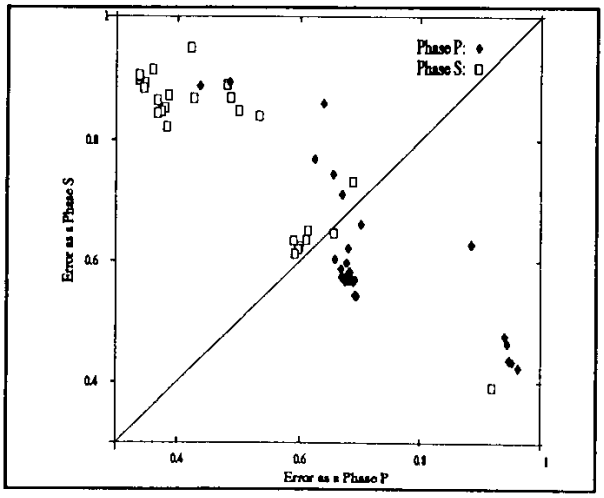




4.3. Seismic signal recognition

We studied the classification of seismic signals in 2 sets S and P which are related to 2 peculiar propagation modes of the seismic waves. Two Neural Crystals are used: one takes the 2-3Hz band-pass seismogram as input and the other the 9-10Hz Band. To produce the "output error", we add errors made by each crystal.





For a given input we calculate then:

The output error Es which evaluates the difference with a typical output S and the output error Ep with a typical output P. Then, if Ep>Es, we conclude that the input signal was a S phase (and resp. for P phase).

The following picture shows Ep versus Es for each seismic signal. The y=x line separates the 2 types S and P.

Learning has been made on 12 P-samples and 12 S-samples recorded from real seismic events on a station A. We trained the network using the previously described algorithm with couples of P and S phases of the same event. 83% of these signals were correctly sorted after learning.

In order to evaluate generalisation capabilities, 56 samples of a station B were given to the network. Results are 77% of correct sorting which is rather good, taking account of particular distortions which are station dependent.

5. CONCLUSION

We have created and tested a simple and compact neural structure which can complete sorting task on time dependent signals. An application for real seismic signals classification has been developed. We showed that it was also able to produce temporal command for robotic applications.

Because implementation of relaxation and learning algorithm has been possible using parallel programmation, we got high level computing performance using the Massively Parallel Processor Cray T-3D.

We would like to thank Mr. G. Clément for useful discussion on learning algorithm and Ms. C. Lebuhan for C langage software development.