

A comparative study of non-hysteretic and hysteretic junctions was made in detail, as hysteresis is undesirable for many devices. Fabrication techniques for hysteretic as well as non-hysteretic junctions were also developed. In particular, the following aspects were studied :

Temperature Modulation : Temperature Modulation studies on non-hysteretic junctions gave an estimate of the junction asymmetry parameter, and inductance of the superconducting loop. Hysteretic junctions showed a prominent periodic variation of critical current with temperature which was markedly different from the temperature variation of critical current for non-hysteretic junctions.

Quantum Interference Effect : Magnetic field modulation was studied in SLUGS by passing a current through the niobium wire in the forward and the reverse direction. For non-hysteretic junctions the periodic variation in critical current with magnetic field was demonstrated. Hysteretic junctions showed a variation of the critical current with the magnetic field without well defined periods. The modulation for hysteretic junctions was studied at various temperatures.

Biasing Effects : Hysteretic junctions showed a variation in the critical current with subsequent sweep cycles, while the non-hysteretic junctions showed no variation with sweep cycles. All the experimental results showed that hysteresis leads to a net trapping of magnetic flux in the course of making a measurement.

3. SOLAR ENERGY GROUP

Progress

Solar Space Heating System : Encouraged by the first major solar energy application in development of a solar space heating system for the Hardwar factory of Bharat Heavy Electricals Ltd., which underwent the first successful run in December 1975, the Laboratory prepared a computer programme for the design of solar space heating systems for developing other such systems.

Solar space heating was also provided in a room in the NPL. In this case a row of collectors was mounted on the top of the building. Water is heated in these collectors and the heated water is circulated through a fan coil unit placed in the room.

Solar Cooling System : There are essentially three approaches that can be followed to achieve space cooling. These are (a) vapour absorption cycle, (b) vapour compression cycle, and (c) de-humidification and evaporative cooling. Detailed analysis showed that vapour absorption cycle was best suited for solar space cooling. For variety of reasons, the

ammonia—water system was selected. Its refrigeration capacity is fairly high and the system can be operated at temperatures which can be attained with simple flat plate solar collectors. System design of a solar cooling system was completed, and fabrication of its first proto-type of about one tonne capacity, was started.

Photo-voltaic Solar Energy Conversion: Efforts were made to develop CdS : Cu₂S solar cells, and initial success was achieved in making a few solar cells with efficiency of 3-4 percent.

TABLE—III

Receipts from the Testing work done by the Division of Specialized Techniques

The various specialized techniques were utilized by the other groups of the Laboratory also. With the spare capacity available, this service was also made available to outside parties on payment of nominal charges. The receipts from this work during 1976-77 are given below :

| Activity | For other groups of the Laboratory | | For outside parties | |
|---------------------------|---------------------------------------|----------------------|---------------------------|----------------------|
| | Number of Test Reports | Test Fee (in Rs.) | Number of Test Reports | Test Fee (in Rs.) |
| (1) | (2) | (3) | (4) | (5) |
| Analytical Chemistry | 45 | 7,090 | 224 | 35,200 |
| Spectro-Chemical Analysis | 63 | 15,365 | □ | □ |
| Infrared Spectroscopy | 30 | 10,405 | — | — |
| Electron Microscopy | 16 | 7,950 | 2 | — |
| X-ray Spectroscopy | 23 | 17,470 | 6 | 1,390 |
| EPR Spectroscopy | 15 | 1,300 | — | — |
| Low Temperature Group | — | — | 2 | 2,840 |
| Total | 192 | 59,580 | 234 | 39,430 |

Note 1 — The figures indicated in column (3) represent the test fee that could have been charged, had the work been done for some outside parties.

Note 2 — A number of jobs done for outside parties are not reflected in the above table as the service was rendered free of charge, and no test reports were issued.

Note 3 — □ The receipts of the Spectro-Chemical Analysis Section are included in the receipts for Photometry, Colorimetry & Radiometry activities of the Division of Standards. (See Table-I on page 24).