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HUGHES DEVELOPS CW RUBY LASER AT ROOM TEMPERATURE

MALIBU, Cal., Feb. 18 -- Scientists at Hughes Aircraft Company's Research Laboratories here have achieved continuous operation of a ruby laser at room temperature.

Although the initial operation is at relatively low output levels, the technique used shows promise of producing significant amount of power - on the order of watts - at visible frequencies, Dr. George F. Smith, associate director of Hughes Research Laboratories, said.

Dr. Smith noted that previously CW operation of most solid-state lasers could be achieved only at cryogenic temperatures where detectors are relatively inefficient. The high power output expected from devices utilizing the new technique, he said, will be useful in many applications where presently available devices perform only marginally.

The new laser, Dr. Smith said, also lends itself to mode control so that frequency purity approaching that of gas lasers may be anticipated.

The laser consisted of an ordinary ruby rod, 2 mm in diameter and 2.54 cm in length, pumped to threshold by a single mercury lamp operating at 1000 watts in a specially designed elliptical cavity. Simple water cooling was utilized to maintain operating temperature.

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Dr. Smith pointed out that high output could be expected from this laser principally because of the efficient utilization of the pump light by the ruby crystal.

In a related experiment, Hughes scientists also have achieved for the first time complete suppression of all but one mode (one output frequency) from a small pulsed ruby laser. The simple mode selection techniques are compatible with the CW configuration and therefore should open the way for solid-state lasers, with their much larger power capabilities, to qualify for many of the applications previously limited to gas lasers, Dr. Smith stated.

Among many possible uses, Dr. Smith said, are doppler radar, communications, and welding applications.

Dr. Smith noted that the new CW ruby laser could make use of a Kerr cell to achieve a continuous train of giant pulses with the operator able to select the pulse spacing. In addition, the laser would lend itself to use with a pulsed power amplifier.

Disclosure of the new laser was made in a paper by Viktor Evtuhov and J. K. Neeland, of the Hughes Research Laboratories, in the current issue of Applied Physics Letters, a publication of the American Institute of Physics. In their paper, the scientists stated that full continuous operation was obtained with an output of 70 milliwatts average.

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