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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

NASA

Astronaut Schirra

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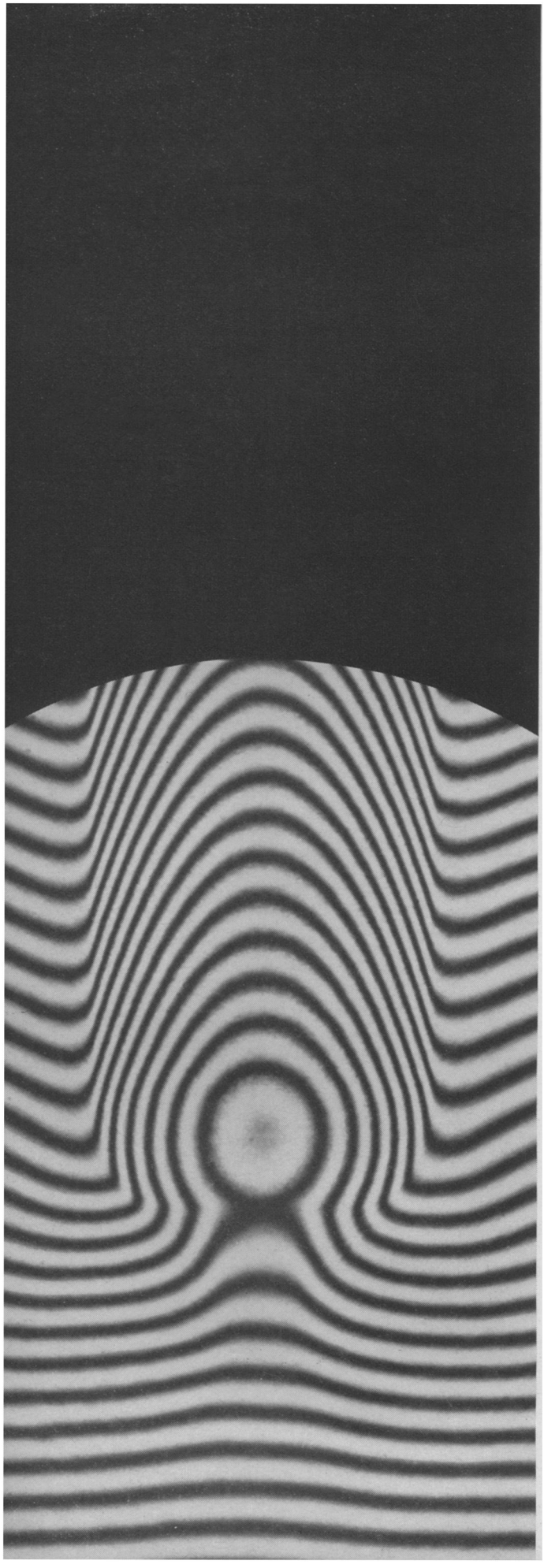
A SCIENCE SERVICE PUBLICATION



One of a series briefly describing GM's research in depth

When two solids touch... plastic strain or dislocations?

The engineer would talk of a plastically strained material. The solid state scientist, of dislocations occurring on the atomic level. Here at the General Motors Research Laboratories, we're interested in learning more about the mechanical nature of solids from both points of view.

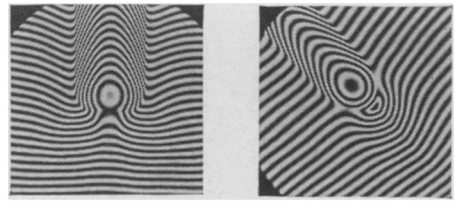
One of our current investigations into the solid state, for example, is aimed at fitting together an atomic picture of what happens when a solid is deformed by a contact force. Simple case: a sapphire ball rolling across a soft single crystal of copper.

For various directions of roll, striking differences in deformation, hardness, and rolling force have been measured and related to the crystal's atomic slip planes. Our work has progressed from this macroscopic correlation to a three-dimensional study of dislocation arrangement. Encouragingly, experimental results have agreed with theoretical predictions as to how specific crystal dislocations interact to cause work hardening—a phenomenon that sharply limits further damage to the material.

A fundamental understanding of mechanical properties may some day help man improve a number of practical contact processes . . . processes where two solids touch. Rolling. Stamping. Pressing. Wear and friction of moving parts. General Motors is seeking this understanding with research in depth.

General Motors Research Laboratories

Warren, Michigan



Ball track across copper crystal is narrower, harder and has higher friction in a cube diagonal direction (right interferogram) than in a cube edge direction.