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"Creep Characteristics of Tension Members in
High Temperatures by Using the Photo-Screen Method"

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A b s t r a c t

The photo-screen method, as it was developed during the previous project DA-91-591-EUC 632, was applied to two main problems: a) In the study of material characteristics of common and special steels at room temperature and at their plastic region of deformation. b) In the study of creep characteristics of various industrial metals and alloys at high temperatures.

The first problem is an interesting application of the method developed for the study of plastic characteristics of materials at room temperature. Series of specimens made of Steel DIN.St.37 and the American Special Steel U.S.S.T.1 are already studied and important results are concluded for the strain distribution. In the region after the yield limit as well as deeply in the plastic deformation. The results will be contained in an interim report.

Meanwhile, the preparation of the specimens made of copper, duraluminium and steel, for the study of the creep comportment of these materials at higher temperatures, are under preparation.

All the equipment necessary for these tests is now acquired and especially the two platinum-resistance thermometers ordered from Germany are received. The whole apparatus is tested in various steps of temperatures and its operation proved to be satisfactory.

Furthermore, a new method for the measurement of minute thickness variations was developed as a byproduct of this yearly research project. This method, named diffused light interferometric method, is a simplified method using diffused yellow light for the measurement of the sum of principal stresses in two-dimensional elasticity problems, as well as for the measurement of the ϵ_z -strains in contained plastic deformation problems. The method does not necessitate a complicated equipment and it is straightforward and very sensitive. It can be applied to transparent as well as to opaque models made of metals. The surface of the specimens though polished, could not be obligatorily optically flat.

The whole method and its applications will be described in detail in the attached technical report. It was presented as a communication at the Athens National Academy of Sciences in its meeting of June 15, 1962 and published in the Proceedings. It is also submitted for publication in the "Journal of Mechanics & Physics of Solids" in England.

Summary of Personnel utilized and expenses for
materials during the yearly period of the program.

a) Personnel Utilized

1) Principal Investigator.	manhours 1100 X 50 dr.=55,000.00 dr.
2) A Graduate Assistant.	" 1100 X 25dr. =27,500.00 dr.
3) Five technicians (part time).	" <u>750 X 20 dr.=15,000.00 dr.</u>
	Total 97,500.00 dr.
4) Secretarial work	manhours 100 X 10 dr.= 1,000.00 dr.

b) Expenses for Materials

1) Photographic Material	4,650.00 dr.
2) Two light projectors(1000 W.) with tripods	9,600.00 dr.
3) Two platinum-resistance thermometers	2,250.00 dr.
4) Lenses for the camera 36 mm.	7,500.00 dr.
5) Metallic specimens, grips and various materials	<u>15,000.00 dr.</u>
	Total 39,000.00 dr.

c) Important Property Acquired

- 1) Two light projectors
- 2) Lenses for camera 36 mm.