MEASUREMENTS OF THE UNSTEADY DRAG COEFFICIENT OF A CIRCULAR CYLINDER

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Some results of an experimental investigation of the pressures and forces associated with the shock-induced air flow around a circular cylinder are presented. The main interest concerns the unsteady drag coefficient. It
gets important when the body size is so large that the diffraction phase can no longer be neglected Timedependent drag coefficients are rarely communicated by the literature, whereas reliable data exist for the steady flow case, taken e. g. from wind-tunnel experiments. Measurements of the pressure acting on a cylinder during the diffraction phase of a shock wave were performed in the test section of a shock tube.
To this end the surface of a cylinder model with a diameter of 100 mm and a length of 40 mm was fitted by pressure gages in angular distances of 20 At each station the pressuretime history was recorded. Simultaneously a series of shadowgraphs was made of each run with the aid of a Cranz-Schardin camera. Thus a sure interpretation of the pressure time curves was possible. The evaluation of the curves yields the pressure, and by numerical integration the forces are found in the direction of the shockfront normal. Using the known definition of the drag coefficient, values of which are gained for various strengths of the incident shock. They are compared with the corresponding steady values and their dependence on the Reynoldsnumber is discussed.