Impact of a vortex ring on a conical wall[1] SERGIO HERNANDEZ
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Facultad de Ciencias, Universidad Nacional Autonoma de Mexico — In this work
we present a numerical and experimental research of a vortex ring impinging a cone.
Both the vortex and the conical wall have the same axis of symmetry. For this study
we solve the Navier-Stokes and continuity equations in cylindrical coordinates using
a finite difference scheme for r, z and time, whereas a Fourier spectral method is
used for the angular variable. As initial conditions we assume that velocity is given
by the Biot-Savart law for a vorticity distribution of constant magnitude inside a
torus. With respect the experiments, measurements of velocity were made with a
hot wire anemometer. To have a mapping in space we use a traverse system to
place the hot wire probe in points of a grid. Additionally, the measurements of
velocity are synchronized with the production of the vortex. Unlike the case of the
impact with a flat wall, in this case the diameter of the vortex ring cannot grow. We
study the shape of the vortex before the impact, the instabilities and the production
of secondary vorticity during the impact. Finally, we made a comparison between
experiment and the numerical simulations.

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