

Abstract Submitted  
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**Measurements in a High Reynolds Number Wake**<sup>1</sup> JUAN JIMENEZ, MARCUS HULTMARK, ALEXANDER SMITS, Princeton University — Experiments were conducted in the Princeton/ONR HRTF windtunnel with air pressurized up to 220atm. The wake of a DARPA SUBOFF submarine model was measured at 5 different downstream locations for Reynolds numbers from  $1 \times 10^6$  to  $70 \times 10^6$ . For all Reynolds numbers studied, the mean velocity distribution is self-similar from 3 diameters,  $D$ , downstream for the side where the support is not located. In contrast, self-similarity in the Reynolds stresses is not reached at the furthest downstream location ( $x/D = 15$ ). The non-dimensional fluctuations are Reynolds number dependent for all measured Reynolds numbers. The energy spectra reveal two peaks in the near-wake. The lower wavenumber peak corresponds to a Strouhal number based on diameter and freestream velocity of about 0.2, suggesting that it is associated with an azimuthal or helical shedding mode in the wake. The peak decays with downstream distance, suggesting that this mode might play a parital role in the approach to self-similarity of the turbulent stresses

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