Analytical Center, m = 20, n = 100 $10^{3}$  $10^{1}$  $10^{0}$  $10^{-2}$ 10<sup>-3</sup>  $\left|f(x)-f^*\right|$ \* \* - $10^{-2}$  $\|\nabla f(x_k)\|$  $10^{-7}$  $10^{-7}$  $10^{-4}$  $10^{-11}$  $10^{-12}$  $10^{-6}$ 250 500 250 500 750 1000 250 500 750 1000 0 750 1000 0 0 Iteration Iteration Iteration  $10^{3}$  $10^{1}$  $10^{0}$  $10^{-2}$ 10<sup>-3</sup>  $|f(x)-f^*|$ \* \* |  $10^{-2}$  $\|\nabla f(x_k)\|$  $10^{-7}$  $10^{-7}$  $10^{-4}$  $\frac{\times}{}$  $10^{-11}$  $10^{-12}$  $10^{-6}$ 0.3 0.3 0.3 0.2 0.2 0.0 0.1 0.2 0.0 0.1 0.0 0.1 Time (s) Time (s) Time (s) GD,  $\alpha = 0.005$ Heavy Ball,  $\alpha$ =0.005,  $\beta$ =0.33 NAG,  $\alpha = 0.005$ ,  $\beta = 0.33$ Newton, damping=1.0