

- ▶ P.D. WELCH,  $\Sigma_3^0$ -*Determinacy and Transfinite Turing Machine models*.  
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At low levels of the arithmetic hierarchy, that is below  $\Sigma_4^0$ , determinacy is provable in second order number theory. It is possible to characterise strategies for  $\Sigma_1^0$  and  $\Sigma_2^0$  games (the latter a result of Solovay) in terms of certain inductive definitions. We survey these results, and ask what can be done at  $\Sigma_3^0$ . There are connections with certain kinds of transfinite Turing machine models, (alternatively characterisable as certain quasi-inductive definitions), and with proof-theoretic considerations, which we explore.