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## EDGEWORTH APPROXIMATION IN THE AR(1) PROCESS WITH SOME POSSIBLY NONZERO INITIAL VALUE

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**Abstract:** This paper shows the validity of the (arbitrary) higher order Edgeworth expansion for the distribution of estimators of the coefficient parameter  $\theta \in (-1, 1)$  in the AR(1) process  $\{X_t\}$  with a possibly nonzero initial value  $X_0 = x$ . The stationary case of  $X_0 \sim N(0, 1/(1-\theta^2))$  is also treated.

**Key words:** Edgeworth expansion, Berry-Esseen bound, moderate deviation, AR(1) process.

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