Kiessling, Michael K.-H.
The “Jeans swindle”: a true story – mathematically speaking. (English) Zbl 1075.76030

Summary: The century-old Jeans dispersion relation enjoys the questionable reputation that it cannot be derived in a mathematically clean manner – as a matter of principle. For that reason Jeans’ ‘derivation’ of his result has become known by the (in)famous sobriquet “the Jeans swindle”. The present paper rectifies the situation by giving just such a mathematically clean derivation of Jeans’ dispersion relation, via a static universe with cosmological constant. The derivation not merely vindicates Jeans’ analysis, it also produces proper nonlinear evolution equations which allow one to study the evolution beyond the linear regime studied by Jeans.

MSC:
76E20 Stability and instability of geophysical and astrophysical flows
85A30 Hydrodynamic and hydromagnetic problems in astronomy and astrophysics
83F05 Relativistic cosmology

Keywords:
Jeans dispersion relation; static universe; nonlinear evolution equations

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