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STABILITY INEQUALITIES INVOLVING GRAVITY NORM AND TEMPERATURE

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Abstract. In the centered surround system $S^{(2)}\{P,\Gamma\}$, where Γ is an ellipse and its eccentricity $e\in[0,1)$, and P is one of the foci of Γ, we establish the following stability inequalities:

$$\sqrt{\frac{4\pi}{15}}\times\frac{e}{\sqrt{1-e^2}}\leqslant\widetilde{\|\mathbf{F}\|}\leqslant\sqrt{2}\times\frac{e}{\sqrt{1-e^2}},$$

where $\widetilde{\|\mathbf{F}\|}$ is the coefficient of variation of the gravity norm $\|\mathbf{F}\|$ and the coefficient $\sqrt{2}$ of $e/\sqrt{1-e^2}$ is the best constant. We also demonstrate the applications of the inequalities in the temperature change research, and obtain an approximate temperature coefficient of variation formula and an approximate temperature mean variance formula as follows:

$$\widetilde{T}\approx 1.164752397618432\cdots\times\frac{e}{\sqrt{1-e^2}}$$

and

$$\overline{\mathrm{Var}}T\approx 1.2897992775023233\cdots\times\frac{e}{(1-e^2)^{3/2}}\times R_{\Gamma}^{-2}.$$

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