Reviewer Comment 1: *"It looks that all the results (resonant energy, linear growth rates, etc.) in this manuscript have already been discussed in other previous studies... In the present form, the novelty of this manuscript is very weak."*

Response:
We thank and appreciate the reviewer's feedback and acknowledge the importance of clearly establishing the novelty of our work. While previous studies, such as those cited (Ahirwar & Meda, 2020; Meda & Ahirwar, 2019; Lazar, 2012; Sugiyama et al., 2015), have explored various aspects of EMIC wave growth under Kappa distributions, our manuscript introduces several significant advancements:

1. **Impact of multi-ion plasma composition (H^+, He^+, O^+) under varying Kappa parameters (κ):**
   Multi-Species Plasma: This study uniquely investigates EMIC wave growth in a multi-ion plasma environment (H+, He+, O+) more complexity compared to single-ion studies, a more realistic representation of space plasma compared to the predominantly single-ion focus of previous studies. This multi-species approach allows us to quantify the distinct contributions of each ion species to wave growth under varying Kappa distributions, a crucial aspect previously unexplored in this context.
2. **Temperature anisotropy effects coupled with Kappa distribution:**
   We go beyond previous studies by analyzing the combined influence of temperature anisotropy and Kappa distributions on EMIC wave properties. While some studies have examined these factors individually or with General loss cone distribution, their synergistic effects in a multi-ion environment have not been comprehensively investigated before. This approach highlights the interplay between these two factors and their impact on wave-particle interactions, a critical aspect absent in the cited studies.
3. **Implications for plasmapause and auroral regions:**
   Our results extend the understanding of EMIC wave growth to regions where multi-ion compositions dominate, such as near the plasmapause and in auroral acceleration zones particularly during space weather events like geomagnetic storms. We believe these specific environmental conditions have not been thoroughly discussed in the cited studies.

4. This study delves deeper into the effects of Kappa distributions on EMIC wave growth by providing a quantitative evaluation. We systematically examine how variations in the Kappa parameter (k_p) – for instance, comparing k_p=2 (representing a significantly non-Maxwellian distribution) to k_p=6 (approaching a Maxwellian distribution) – influence key wave characteristics such as growth rates, resonant energies, and spatial profiles. This level of quantitative analysis surpasses the scope of some previous studies, such as Sugiyama et al. (2015), which primarily focused on qualitative assessments of Kappa-Maxwellian particle distributions. By meticulously comparing these variations, our study

unveils a crucial finding: low k_p values significantly enhance EMIC wave growth, particularly for heavy ions, due to a pronounced increase in wave-particle resonances.

Distinction from Cited Studies

Study	Focus	Limitation	Novelty of Our Work
Ahirwar & Meda (2020)	Effect of parallel electric fields on EMIC waves with Kappa distributions	Focuses on single-ion (H^+) plasmas with effect of parallel electric fields	We incorporate multi-ion plasmas (H^+, He^+, O^+) and examine combined effects of anisotropy and κ values
Meda & Ahirwar (2019)	EMIC instability in cusp regions with Kappa distributions	Primarily studies wave growth near the cusp	Our work targets plasmapause and auroral zones, emphasizing relevance to diverse space environments
Lazar (2012)	Electromagnetic ion-cyclotron instability in bi-Kappa plasmas	Limited to bi-Kappa distributions in homogeneous plasmas	We study multi-ion plasmas with varying κ and anisotropy in non-homogeneous environments.
Sugiyama et al. (2015)	EMIC waves with Kappa-Maxwellian distributions in the Earth's magnetosphere	Lacks detailed multi-ion analysis and does not quantify the role of heavy ions	Our study evaluates the distinct roles of H^+, He^+, O^+ under Kappa distributions

We will revise the Introduction and Discussion sections to explicitly highlight these unique contributions to distinguish our work from prior studies.

Reviewer Comment 2:

"EMIC wave growth can be essentially characterized by nonlinear effects (e.g., Shoji & Omura, 2013), but there are no discussions on the nonlinear effects. The authors should discuss the effects of nonlinear wave growth by Kappa distributions."

Response:

We appreciate the reviewer's suggestion regarding nonlinear wave growth. While our current study focuses on the linear growth rates of EMIC waves, we acknowledge that nonlinear effects play a crucial role in wave amplification and energy transfer processes. our study focuses on linear growth rates and that future work will explore nonlinear effects through advanced numerical methods (e.g., Particle-in-Cell simulations).

Expanded Discussion:
We will incorporate a section in the Discussion to describe how nonlinear wave growth mechanisms could interact with Kappa-distributed plasmas. For instance, we will reference Shoji & Omura (2013) to discuss how nonlinear effects might alter the wave-particle resonances and contribute to wave energy saturation in low κ regimes.
As a part of our revised manuscript, we will acknowledge this limitation and propose future work to study nonlinear effects explicitly through Particle-In-Cell (PIC) simulations or nonlinear analytical techniques.

By integrating these elements, we aim to provide a more comprehensive understanding of the EMIC wave growth process.

Reviewer Minor Comment :
"Line 37: Region24?"

Response:
We appreciate the reviewer's attention to detail. The reference to "Region24" was a typographical error and will be corrected in the revised manuscript. We will ensure that all such references are verified for accuracy.

Additional Revisions to Address the Reviewer's Concerns:

1. **Detailed Comparison with Prior Studies:**

   A new subsection will be added to the **Result and Discussion** section, explicitly comparing our findings with those of the cited studies. We will focus on key differences, particularly in terms of ion composition, anisotropy effects, and environmental relevance.

2. **Improved Figures and Captions:**

   The captions for all figures will be revised to include more detailed explanations, highlighting their relevance to the discussion. Additionally, new plots showcasing the sensitivity of wave growth to κ values and anisotropy will be added to strengthen the results.

3. **Implications:**

   We will expand the discussion to address the practical implications of our findings for space weather forecasting and plasma dynamics in magnetospheric environments. This will emphasize the importance of temperature anisotropy and Kappa distributions in shaping EMIC wave behavior.

We are grateful for the constructive feedback, which will significantly enhance the quality of our manuscript. Once the revisions are made, we hope that the revised manuscript will meet the expectations of the reviewer and the broader space plasma community.