Furthermore, we would like to point out that: 1) Section II.A. "Instantaneous Model of a Transistor" and Section II.B. "Small-Signal Equivalent Circuit" of Corbella *et al.'s* [1] are taken from [2], with very small changes; 2) the authors' intrinsic FET models of Figs. 1 and 2 [1] were taken from Figs. 2.5 and 2.9 of [2; pp. 25 and 30]; 3) Eqs. (1) and (2) of [1] are the same as Eqs. (2.1.a) and (2.1.b) of [2; p. 25] except that Corbella et al. [1] use subscripts g and d instead of gs and ds; 4) Eqs. (4)–(6) of [1] correspond to Eqs. (2.3.a), (2.3.b) and (2.4. a–h) of [2; p. 26]; and, 5) Eq. (7) of [1] is identical to Eqs. (2.9.a–h), (2.10) and (2.11) of [2; pp. 30–31].

In addition, we would also like to indicate that Dr. Corbella was a member of the Dr. Entrambasaguas' Ph.D. thesis committee and defense. This defense took place on 25 September 1990. Therefore, Dr. Corbella was fully aware of our research on MESFET nonlinear models.

It seems clear from previous paragraphs that Corbella and co-workers took our model and properly referred to it in [5,6] and, then, they decided: 1) to claim that our model was theirs [1], [7], and 2) not to mention our previously published work [3,4].

In support of the issues addressed in this Letter, we sent copies of the References [1]–[7] to the Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES and kindly requested from him to send them to the Guest Editors, Drs. Bandler and Jansen, of the Special Issue on Process Oriented CAD and Modelling, where Corbella et al.'s paper was published. We also requested from him to send a copy of this Letter to the authors of [1].

The issues addressed in this Letter should not be considered as criticisms on the review process of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, because we do not expect the reviewers to know every single paper on MESFET models published in all languages. They do, however, address very important issues on professional ethics, priority and integrity in the scientific community.

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Reply to Comments on "Instantaneous Model of a MESFET for Use in Linear and Nonlinear Circuit Simulations"

Ignasi Corbella

I was very surprised when I received from the editor of the IEEE Transactions on MTT a letter from my friend Carlos Camacho with the comments to the paper I published in these transactions [1]. I had no previous notice from the authors and, at first, I was pleased because I thought that the comments would address some scientific issue, which would be interesting, not only for he and me, but also for all the microwave community. But the aim of the comment was very different and now I am forced to write a rebuttal with arguments and discussions that I am afraid will not be valuable to the readers of these transactions.

When I decided to publish the paper [1], I did it with the intention of summarizing the work I had being carried out since 1987 with the aid of some students, and make it available to the international microwave community, in order to contribute to this difficult subject that is the nonlinear modelling of transistors. It has never been my intention to claim that someone else's ideas are mine, nor to assume a protagonism regarding nonlinear modelling in Spain. In the following paragraphs I will explain the history of the published and unpublished work I have performed since 1987, and it is the responsibility of the reader to discern whether the comments of Dr. Camacho are justified or not. First of all, however, I would like to stress that anyone that in the future want to use the model described in [1] should always refer to it as "model of Camacho-Peñalosa and Entrambasaguas-Muñoz" but never as "model of Corbella." I really don't mind.

By the end of 1987 I was considering the idea of modelling the nonlinear capacitive effects of transistors in terms of charge. The advantage with respect to a variable capacitor approach is that the harmonic balance algorithms can be faster because no convolutions are needed. The complete model would consist then of instantaneous charge generators and, of course, current generators to account for the ohmic current. In this way the elements of the small signal equivalent circuit would be simply the slopes of these nonlinear current and charge functions with respect of the two internal voltages. Assuming the quasistatic approximation, the integration of the small signal model at many different bias points with respect to these voltages would give the instantaneous charge and current functions.

This was the theme of a master thesis of a student that ended in June 1988 and the results were published in a spanish conference [2] not mentioned in the comments above. The model presented there was the precursor of that given in [1], being the only difference that, referring to Fig. 1 of [1], the generators $I_g(V_g, V_d)$ and $Q_d(V_g, V_d)$ were not considered. The integration of the small signal model to obtain the instantaneous charge and current functions was presented, and a harmonic balance load pull simulation was described. The model was applied to a simulation of the optimum load for a power amplifier.

During the Spanish URSI conference, in September 1988, I noticed that there was another paper that presented a similar model [3], with all four current and charge generators, in a very elegant way. In spite of the title, however, the authors did not use it for nonlinear modelling nor explained the way of obtaining the instantaneous current and charge functions. Instead, the article was oriented to the discussion

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The author is with the Department of Signal Theory and Communications, Polytechnic University of Catalonia, P.O. Box 30002, 08080 Barcelona, Spain.

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of how good could be the S-parameter fitting (small signal) with a topology that is that of Figure 2 of [1]. The Ph.D. thesis of one of the authors (Dr. Entrambasaguas) [4] was devoted to the frequency dispersion of the elements of small signal models of MESFET transistors. He proposed a model to account for the transverse propagation in the transistor, which, according to him, was the responsible for the frequency variation of the circuit elements. This model consisted of the parallel connection of a number of sections consisting each one of a basic model. The idea is that this basic model is only valid for a MESFET with very small gate width. He proposed as basic model two topologies, being one of them the one he had presented in [3] (the same of Fig. 2 of [1]). Again, he did not discuss the nonlinear analysis of the model, and all the measurements and the simulations were performed at small signal and one single bias point.

In my subsequent work on the same subject, apart from improving the parameter extraction method and the harmonic balance algorithms, I completed the model presented in [2], by considering all four charge and current generators and using the formalism of Y-parameters that Camacho *et al.* presented in [3] (equations (1) to (7) of [1]). In due recognition of their work, I referenced them in all my publications, including [1]. In this case, however, I wasn't aware that referencing to the Ph.D. thesis of Dr. Entrambasaguas [4] could be misunderstanding for a reader who did not know the Spanish microwave community. It might seem as if I had been the advisor of the Ph.D. thesis of Dr. Entrambasaguas and the paper [1] was simply a synopsis of it. I am sorry for that misunderstanding, although I still consider that their work was properly referenced in [1], since it clearly states "proposed previously in [8]".

Referring to [5] of which the authors of the comments above complain that "perhaps not surprisingly" there is no reference to their previous publications, it is worth noting that [5] is not devoted to presenting new aspects of nonlinear modelling, but to making a review of the results obtained in measurement and modelling of transistors by our laboratory and a German one, in the frame of an European collaboration. The references are inserted to address the interested reader to where he (she) can obtain more information on the procedures.

Perhaps it is too optimistic to claim that my paper is a new approach for nonlinear modelling, but in any case it is not their approach, because, as it has been apparent from the previous paragraphs, they don't have any, at least regarding nonlinear modelling.

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Comments on "Optimum Noise Measure Terminations for Microwave Transistor Amplifiers"

Ji-Chyun Liu, Sheau-Shong Bor, and Po-Chiang Lu

Continued from the above letter [2], it is found that the determination of the stable region in Fig. 2 of the paper is another incorrect one.

Generally, the input stability circle is plotted by using

$$|\Gamma_{\text{out}}| = \left| S_{22} + \frac{S_{12}S_{21}\Gamma_s}{1 - S_{11}\Gamma_s} \right| = 1 \tag{1}$$

This time, in the circle of (1), if $|S_{22}| < 1$, then $|\Gamma_{\text{out}}| < 1$ when $\Gamma_s = 0$. Restated, the center of Smith chart represents a stable operating point in the stable region [1]. Based on the given parameters of NE71083, $|S_{22}| = 0.616 (< 1)$, the value of Γ_{om}^* lies inside the stable region without doubt.

The output stability circle is plotted by using

$$|\Gamma_{\text{in}}| = \left| S_{11} + \frac{S_{12}S_{21}\Gamma_l}{1 - S_{22}\Gamma_l} \right| = 1 \tag{2}$$

This circle can be transferred it to the source plane by using output-match, $\Gamma_l = \Gamma_{\text{out}}^*$ ($= S_{22}^*$ when $\Gamma_s = 0$); if $|(S_{11} - \Delta S_{22}^*)/(1 - |S_{22}|^2)| < 1$, then $|\Gamma_{\text{in}}| < 1$. Similarly, the center of Smith chart represents a stable operating point in the stable region. However, based on the given parameters, $|(S_{11} - \Delta S_{22}^*)/(1 - |S_{22}|^2)| = 1.784 (> 1)$, the center of Smith chart is not a stable operating point. Thus, the value of Γ_{out} lies outside the stable region. This is a incorrect determination in the paper

When designing a matched amplifier where both input and output stability conditions are to be considered simultaneously, the cross-over region (shown in Fig. 1) is therefore considered as the unconditional stable region.

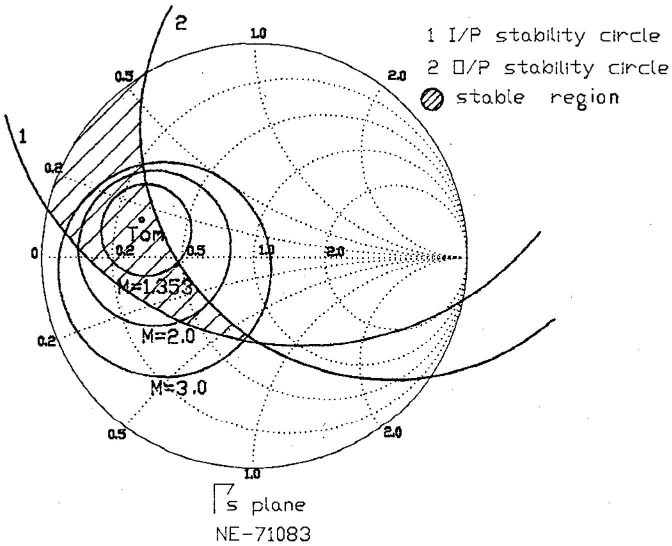

Fig. 1. The stable region determined by both input and output stability circles in source plane.

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The authors are with the Department of Electrical Engineering, Chung Cheng Institute of Technology, 33509, Ta-Hsi, Tao-Yuan, Taiwan, R.O.C.

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