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ANOTHER PROOF OF THE STRONG COMPLETENESS OF THE INTUITIONISTIC FUZZY LOGIC

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Takeuti and Titani [3] introduced the system, which we shall call TT, for the intuitionistic fuzzy logic, and proved the following theorem:

STRONG COMPLETENESS THEOREM (Takeuti and Titani [3, Theorem 1.3]). *Suppose that the language of* TT *is countable. If a sequent* $\Sigma\Rightarrow\Delta$ *is valid then it is provable in* TT, *where* Σ *may be infinite.*

The purpose of this note is to give another proof of the above theorem.

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§ **1.** Recall, first, that the axioms and inference rules of TT are those of the intuitionistic logic (Gentzen's LJ) together with the following ones:

EXTRA AXIOM SCHEMATA FOR TT.

1. $\Rightarrow(A\rightarrow B)\vee((A\rightarrow B)\rightarrow B)$;
2. $(A\rightarrow B)\rightarrow B\Rightarrow(B\rightarrow A)\vee B$;
3. $(A\wedge B)\rightarrow C\Rightarrow(A\rightarrow C)\vee(B\rightarrow C)$;
4. $A\rightarrow(B\vee C)\Rightarrow(A\rightarrow B)\vee(A\rightarrow C)$;
5. $\forall x(C\vee A(x))\Rightarrow C\vee\forall xA(x)$, where x does not occur in C;
6. $\forall xA(x)\rightarrow C\Rightarrow\exists x(A(x)\rightarrow D)\vee(D\rightarrow C)$, where x does not occur in D.

EXTRA INFERENCE RULE FOR TT.

$$\frac{\Gamma\Rightarrow A\vee(C\rightarrow p)\vee(p\rightarrow B)}{\Gamma\Rightarrow A\vee(C\rightarrow B)},$$

where p is any propositional variable not occurring in the lower sequent.

We call that system TT^- which is obtained from TT by deleting Extra Inference Rule for TT.

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