Since $\pi_L f = 0$ if $L \notin \cup_c N(c)$, then $\Sigma_L \pi_L f$ converges to f in the Krull topology.

We finally consider property (3) for $M = \mathbf{k}[[x]]$ or $\mathbf{k}\{x\}$. Let I be an invariant ideal in M. Then $I \cap M_c$ is an invariant subspace of M_c. It follows that if $f \in I$, then $\pi_L f \in I + \mathfrak{m}^{c+1}$ for all $c \in \mathbf{N}$, so that $\pi_L f \in I$ by Krull's theorem [14, 16.7]. Moreover

$$\mathrm{End}_{\mathbf{k}}(L, I) = \bigcap_{c \in \mathbf{N}} \mathrm{End}_{\mathbf{k}}(L, I + \mathfrak{m}^{c+1}) .$$

Let $f \in I$. Writing $f = T^c f + R^c f$ and using the functorial property of the Reynolds operators, we have

$$E_{M^L}(\mathrm{Tr}\, v_{j,L}^{\#} \otimes T^c f) \in \mathrm{End}_{\mathbf{k}}(L, I \cap M_c) ,$$

$$E_{M^L}(\mathrm{Tr}\, v_{j,L}^{\#} \otimes R^c f) \in \mathrm{End}_{\mathbf{k}}(L, \mathfrak{m}^{c+1})$$

for all $c \in \mathbf{N}$. Since $I + \mathfrak{m}^{c+1} = I \cap M_c + \mathfrak{m}^{c+1}$, it follows that

$$E_{M^L}(\mathrm{Tr}\, v_{j,L}^{\#} \otimes f) \in \mathrm{End}_{\mathbf{k}}(L, I).$$

This completes the proof of Proposition 4.1.

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