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Report on proposed Editorial Changes on the Revised Supplementary Release on Backward Equations for Specific Volume as a Function of Pressure and Temperature $v(p, T)$ for Region 3 of the IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam

Background:

- 07/13/2016: Request from Dr. Peter Franz from Mighty River Power (hydroelectric and geothermal power plant operator in New Zealand):
  - Implemented the IAPWS backward equations for $v(p, T)$ into a reservoir simulator
  - Found that the simulation got stuck in a small area around the critical point
  - Plotted a diagram to visualize the problem ...
Densities at Saturation in the Vicinity of the Critical Point:

\[ f_3(T, \nu) \text{ and } p_s(T) \]

\[ \nu_{\text{BWE}}(p, T) \text{ and } p_s(T) \]
Backward Equations and Auxiliary Equations for $v(p,T)$ in Region 3:

Backward Equations $(3a - 3t)$

Auxiliary Equations $(3u - 3z)$

$p_{97}^{97}(T)$

$p_{B23}^{97}(T)$

$T_{3qu}(p)$

$T_{3rx}(p)$

$p_{sat}(T)$

Region 3:

$p$, $T$, $T/\text{K}$

$p$, $T$, $T/\text{MPa}$

$p$, $T$, $T/\text{K}$

$p$, $T$, $T/\text{MPa}$

$p$, $T$, $T/\text{K}$

$p$, $T$, $T/\text{MPa}$

$p$, $T$, $T/\text{K}$

$p$, $T$, $T/\text{MPa}$

$p$, $T$, $T/\text{K}$

$p$, $T$, $T/\text{MPa}$

$p$, $T$, $T/\text{K}$
Auxiliary Equations for $v(p, T)$ in the Vicinity of the Critical Point:
Densities at Saturation in the Vicinity of the Critical Point:

Density $\rho$ [kg/m$^3$]

Temperature $T$ [K]
The International Association for the Properties of Water and Steam

Moscow, Russia
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Revised Supplementary Release on Backward Equations for Specific Volume as a Function of Pressure and Temperature $\nu(p, T)$ for Region 3 of the IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam

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Thank you for your attention!